DOCUMENT RESUME

ED 344 942 TM 018 342

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TITLE	Investigation of the Dimensional Structure of the P-ACT+.
INSTITUTION	American Coll. Testing Program, Iowa City, Iowa.
REPORT NO	ACT-RR-91-1
PUB DATE	May 91
NOTE	103p.
AVAILABLE FROM	American College Testing Research Report Series, P.O. Box 168, Iowa City, IA 52243.
PUB TYPE	Reports - Evaluative/Feasibility (142)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*College Entrance Examinations; Estimation (Mathematics); Factor Analysis; *Factor Structure; High Schools; *High School Students; *Item Response Theory; Scores
IDENTIFIERS	Ability Estimates; *Dimensionality (Tests); Parallel Test Forms; *Preliminary American College Test Plus; Stouts Procedure

ABSTRACT

Results of several analyses of the dimensional structure of four forms of the Preliminary American College Test Plus (P-ACT+) are presented. Dimensionality was assessed using factor analysis, multidimensional item response theory (IRT), and the Stout Test for Essential Unidimensionality (STEU). Analyses were conducted with data from the spring 1987 and 1988 equating administrations of the P-ACT+, each with about 1,600 examinees. Factor analyses showed that all tests contained a dominant factor with several additional factors of varying importance. These results were essentially replicated by the multidimensional IRT (MIRT) analyses. The STEU indicated that the tests on each form were not unidimensional. These findings, combined with those from factor analyses and IRT analyses, raise questions concerning the appropriateness of a unidimensional IRT model for score reporting. Consistency of dimensional structure across test forms was investigated by comparing factor patterns, MIRT item statistics, and classical item statistics (p-values, point-biserials, and intercorrelations among scores). Factor patterns and MIRT analyses indicated reasonably consistent patterns in the dimensional structures. Classical analyses also revealed considerable similarity across forms. Use of a unidimensional IRT model will probably provide ability estimates with comparable meaning across test forms. Thirty-four tables and 24 plots present analysis results. There is a five-item list of references. (SLD)

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ED344942

ACT Research Report Series **91-1**

Investigation of the Dimensional Structure of the P-ACT+

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May 1991

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INVESTIGATION OF THE DIMENSIONAL STRUCTURE OF THE P-ACT+

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ABSTRACT

This report provides a summary of several analyses concerned with the dimensional structure of Forms 7A, 7BΔ, 8A, and 8B of the P-ACT+. Two basic questions drove the analyses: 1) are the data from the P-ACT+ sufficiently unidimensional to justify the use of unidimensional IRT models for score reporting, and 2) are the different forms similar in whatever dimensional structures may be revealed?

The dimensionality of the tests were assessed using factor analysis, multidimensional IRT, and the Stout Test for Essential Unidimensionality. The factor analyses showed that all tests contained a dominant factor with several additional factors of varying importance. For the English, Reading, and Science Reasoning tests the dominant factor appeared to be a general factor in each of those content areas while the smaller factors were method or nuisance factors. The factor patterns for the Mathematics tests were interpretable in terms of content. These results were essentially replicated by the multidimensional IRT analyses.

The Stout Test for Essential Unidimensionality indicated that the tests on each form were not unidimensional. These results, combined with those from the factor analyses and MIRT analyses, raise questions concerning the appropriateness of applying a unidimensional IRT model to these tests for score reporting purposes.

The consistency of the dimensional structure across the test forms was investigated by comparing the factor patterns, the MIRT item statistics, and classical items statistics (i.e., p-values, point-biserials, and intercorrelations between scores). The factor patterns indicated a reasonable degree of consistency in the dimensional structures across forms for each of the tests. The MIRT item statistics tended to show more variability across forms but still indicated consistent patterns. Both analyses showed greater similarity between forms developed in the same year than between forms developed in different years (i.e., forms 7A & 7BΔ vs. forms 8A & 8B).

Analyses of p-values, point-biserials and score intercorrelations also revealed considerable similarity across forms. These findings, in conjunction with those from the factor analyses and MIRT analyses, would indicate that the dimensional structure is relatively consistent across forms for all tests. Since this is the case the use of a unidimensional IRT model will probably provide ability estimates with comparable meaning across test forms. The issues raised in this paper are investigated further in the companion paper "Assessing the Appropriateness of the Unidimensional IRT Model for Estimating Content Area Scores".

Introduction

This study investigated the dimensional structure of the P-ACT+ (Forms 7A, 7BΔ, 8A, and 8B) and assessed the parallelism of this structure across forms. The primary interest was in determining 1) if the data from the P-ACT+ are sufficiently unidimensional to apply a unidimensional IRT model for scoring purposes, and 2) the degree to which the dimensional structures of P-ACT+ data, whatever those structures may be, are equivalent across forms. It was intended that this information would be useful for both future test development as well as current projects pertaining to expanded score reporting for the P-ACT+.

The P-ACT+ battery consists of individual tests in four main content areas: English (50 items), Mathematics (40 items), Reading (25 items), and Science Reasoning (30 items). Items in each of these content areas are further classified according to a two-way table of content specifications, and the proportions of items within each classification remain constant across forms. Currently, total scores are reported on each test, and within the areas of English and Mathematics, subscores are also reported. The focus of this study was on the relationships between items in the various content and subcontent classifications and the consistency of the relationships across the test forms.

This paper presents a summary of each of the analyses performed on the P-ACT+. The analyses were carried out on data from the Spring 1987 and 1988 equating administrations, each of which involved approximately 1600 examinees. Forms 7BΔ, 8A, and 8B were administered to randomly equivalent groups in Spring 1988, while form 7A was administered in Spring 1987. The data were analyzed at three levels:

1) the item level, 2) the content area score level, where content areas are defined by the cells of the tables of specifications, and 3) the subscore level, that is, the subscores in Mathematics and English that are reported. The analyses consisted of a factor analysis of each form at the item and content area score level, an examination of the item p-values and point-biserials of items with total score, a comparison of the correlations between subtest scores across test forms, and the application of the Stout Test (Stout, 1987) for essential unidimensionality. Analyses involving a compensatory multidimensional item response theory (MIRT) model were also performed to further explore the dimensional structure of the tests and to build upon the results found with the item level factor analyses.

Factor Analysis

The following is a brief summary of the factor analyses that have been performed on the P-ACT+. The main content areas of English, Mathematics, Reading, and Science Reasoning were analyzed at the item level as well as the content area score level, where, as noted above, the content area scores were defined in terms of the classifications contained in the tables of specifications. Initially, several different factor solutions were evaluated with emphasis being placed on the clarity of the factor interpretations and the replicability of the factor structure across the different forms within a content area. The results presented here represent the most clearly identifiable and consistent solutions obtained from these analyses.

Summary of Item Level Analyses

Eigenvalue plots for the item level factor analyses are presented in Figures 1 - 4, all of which indicate a large first root and a relatively small second root, suggesting approximate unidimensionality within each of the four major content areas. However, the emphasis in this analysis was not to provide the most parsimonious solution, but rather to search for replicable factor patterns across forms using a sufficiently large factor space to permit the appearance of even relatively minor factors. The following results reflect this emphasis.

INSERT FIGURES 1 - 4 ABOUT HERE

English

It was determined that a six factor solution followed by an oblique rotation (DAPPFR) (Tucker & Finkbeiner, 1981) provided the most interpretable and replicable factor structures for the English tests. These results are presented in Tables 1 - 4. The five largest factor loadings for each factor are underlined to aid in the interpretation of the factors.

INSERT TABLES 1 - 4 ABOUT HERE

A consistent factor structure appears when the factor loadings are compared across forms. In all forms, the second factor can be identified as a speededness or "last

passage" effect with high loadings coming primarily from those items near the end of the test.

Another factor which consistently appears across forms is identified by items with "no change" as the correct answer. This is the fourth factor in forms 7A and 8B, the third in form 7BΔ, and the fifth and sixth in form 8A.

A factor identified by items with "omit" as the correct answer appears in all forms except 8B. In form 7A this is factor 6 (items 10, 16, & 17), in form 7BΔ it is factor 4 (items 7, 9, & 15), and in form 8A it is again factor 4 (items 1, 7, 8, & 19). This factor was weak and did not appear consistently in solutions with less than 6 factors, probably because only 3 or 4 items exist in forms 7A, 7BΔ, and 8A with "omit" as the correct answer. Form 8B has only 1 item of this type and consequently the "omit" factor does not appear.

The remaining factors in each form appear to be general factors with the exception of factor 3 in form 8A. Inspection of item content suggests a "punctuation" interpretation for this factor. It is interesting to note that this is the only factor that appears to be identified by items of the same content classification. All other factors seem to reflect either general English language skill or method effects.

Mathematics

Tables 5 - 8 contain the results of four factor solutions for the Mathematics tests. For each form, three factors consistently appeared. An Algebra factor can be seen as factor 1 in forms 7A and 8B and as factor 3 in forms 7BΔ and 8A (the third factor). Factor 2 in forms 7A and 8A, factor 4 in form 7BΔ, and factors 2 & 3 in form 8B can be

labeled as Geometry factors. Another factor can be identified primarily with word problems and geometry items involving angles. This word problems/angle problems factor is factor 3 in form 7A, factor 1 in form 7BΔ, factor 4 in form 8B. It is not distinguishable in form 8A. The remaining factor in each form is unidentifiable.

INSERT TABLES 5 - 8 ABOUT HERE

Reading

Three factors appeared to replicate across forms for the Reading tests, each of which corresponds to one of the three passages contained in these tests. However, since each passage is associated with a specific content area - Prose, Humanities or Social Studies - passage and content effects are confounded and labels for the factors are ambiguous.

A speededness factor appears in each form but it also is difficult to separate from the passage or content effects since the content of the last passage is the same for all forms. Tables 9 - 12 contain the results from the Reading factor analyses.

INSERT TABLES 9 - 12 ABOUT HERE

At the item level the factor analyses failed to reveal a Referring or Reasoning factor that would correspond to the test specifications. To further explore this, principal component analyses of content area scores computed from the referring and reasoning items in each passage were performed. The results of these analyses are presented in a later section.

Science Reasoning

As with the Reading tests, three factor solutions were used for the Science Reasoning tests. These results are presented in Tables 13 - 16. An inspection of the content of the items loading most highly suggests a Biology/Philosophy of Science factor, a Physical Science factor, and a speededness factor (Factor 2 in all forms) on all forms.

INSERT TABLES 13 - 16 ABOUT HERE

There was no indication of a Data Representation (DR), Research Summary (RS), or Conflicting Viewpoints (CV) factor corresponding to the test specifications. The small number of possible subtest scores (3) precluded principal component analyses at the content area level.

Summary of Variance Explained by Factor Solutions

Because oblique solutions were used, determination of the percent of variance accounted for by each factor must take into account both their direct and joint contributions. The direct contributions are simply the sum of the squared loadings, which, in the case of uncorrelated factors would be the total contributions. The joint contributions of the factors are the contributions to the variance accounted for through the interactions with the other factors. In this analysis, the total percent of variance accounted for by each factor was computed as follows. First, the factors were arranged from largest to smallest in terms of their direct contributions. Then, beginning with the factor having the largest direct contribution, that contribution was summed together with

that factor's joint contributions with the m - 1 remaining factors. Next, the factor with the second largest direct contribution was selected and that factor's direct contribution was summed together with its joint contributions with the remaining m - 2 factors. This process was repeated until the last factor, whose contribution would simply be its direct contribution. Although the total contribution of a factor computed in this way depends on the order of entry, consistent application of this procedure will permit comparisons across forms.

English

Table 17 shows the proportion of variance explained by each of the factors for the general English test (Forms 7A, 7BΔ, 8A, and 8B). In form 7A the three English factors (Factors 1, 3, & 5) represent the largest amounts of variance, and the speededness and "no change" factors (Factors 2 & 4 respectively) account for lesser amounts of explained variance. The "omit" factor (Factor 6) accounts for only 3% of the explained variance.

INSERT TABLE 17 ABOUT HERE

In form 7BΔ the general English factors 1 and 6 account for a combined total of 72% of the explained variance. The speededness, "no change", and "omit" factors (factors 2, 3, & 4 respectively) account for 5% to 14% of the explained variance.

Factors 4 and 5 in form 8A were originally labeled "omit" and "no change" factors. However, judging from the amount of variance each factor explains it appears that the labels may be misleading. These factors are more likely some type of general English

factors. The speededness factor in this test is the second largest factor in terms of proportion of explained variance.

Form 8B has one large general English factor (Factor 1) accounting for 48% of the explained variance with the second largest factor being speededness (Factor 2).

Mathematics

The results for the Mathematics tests are presented in Table 18. In form 7A the Algebra and Geometry Angles - Word Problems factors (Factors 1 and 3 respectively) are the largest factors in terms of proportion of explained variance. Factor 2, which was labeled a Geometry factor, accounts for only 15% of the explained variance.

INSERT TABLE 18 ABOUT HERE

In Table 18 the general Mathematics factor (Factor 2) and the Algebra factor (Factor 3) accounted for 44% and 32% respectively of the explained variance in form 7BΔ. Unlike form 7A, the Geometry Angles - Word Problems factor in this form accounted for only 8% of the explained variance.

The largest factor in form 8A is the first factor which was labeled a general Mathematics factor. The Geometry factor was the second largest factor accounting for 31% of the explained variance.

In the last form (8B), the Geometry factor (Factor 3) is the largest factor in terms of the variance explained with the Algebra factor (Factor 1) being the second largest.

Reading

As noted earlier, for the reading tests the three factors tended to be defined primarily by the three passages (the speededness and the third passage effects can not be separated) found on each form. In forms 7A, 8A, and 8B the first factor accounts for the most variance and the third factor the least. On form 7BΔ the second and third factors are reversed in importance. These results are listed in Table 19.

INSERT TABLE 19 ABOUT HERE

Science Reasoning

Table 20 contains the results for the Science Reasoning tests. In all forms the first factor is labeled a Biology/Philosophy of Science - General factor and the second factor represents a speededness factor. For all forms the first factor explains the largest amount of variance. The third factor accounts for the least amount of variance in all forms except form 8B.

INSERT TABLE 20 ABOUT HERE

Summary of Content Area Analyses

Content area scores based on the subcontent categories contained in the test specifications were computed for each examinee and subjected to principal component analysis. The main purposes for these analyses were 1) to evaluate the contributions of

each subcontent area to the total variance, and 2) to further explore the extent to which the structure implied by the test specifications is actually reflected in the data. Although item level analyses generally failed to reveal such structure, it is possible that the method effects found at the item level may have masked or distorted content structure. Analyses at the content area level may be more revealing with respect to the content specifications. Table 21 contains the eigenvalues from these analyses, scree plots are given in Figures 5 - 8, and Tables 22 - 25 give the principal component loadings.

INSERT TABLE 21 ABOUT HERE

English

Five content area scores were computed from the English items: Punctuation, Grammar/Usage, Strategy, Organization, and Style. First eigenvalues of the correlation matrices computed from these scores accounted for 66% to 74% of the variance across forms. Second eigenvalues accounted for 9% to 11%. Scree plots (Figure 5) indicated one factor and indeed the solutions revealed a general English first component on all forms (see Table 22). However, a second component was clearly indicated and tended to differentiate between Strategy and Punctuation on forms 7A, 7BΔ, and 8B, and between Punctuation and Style on form 8A. Although these content areas are contained within the Usage/Mechanics and Rhetorical Skills subtests for which subscores are reported, a more general division between the latter content areas was not found.

INSERT FIGURE 5 ABOUT HERE

INSERT TABLE 22 ABOUT HERE

Mathematics

Four content area scores were computed from the Mathematics tests: Pre-Algebra, Elementary Algebra, Coordinate Geometry and Plane Geometry. First eigenvalues from these data accounted for 66% to 76% of the variance across the forms. Second eigenvalues accounted for 11% to 14%. Again, scree plots (figure 6) indicated one large component, and from Table 23 it can be seen that the loadings on the first component of the 2-component solutions indicated one large general mathematics component with little variability of loadings within forms and high consistency across forms. The relatively small second component tended to spread out the subtests, but the nature of this spread was inconsistent across forms. The 1988 forms (8a and 8b) were very similar to each other. The 1987 forms (7a and 7b) were different from each other as well as the 1988 forms. It is noteworthy that the second component did not differentiate between Algebra vs. Geometry. Rather, in forms 8A and 8B, that component placed Coordinate Geometry and Plane Geometry on opposite ends of a dimension. In form 7A, the second component tended to separate Plane Geometry from all other subtests while in form 7BΔ it separated Coordinate Geometry from the other subtests.

INSERT FIGURE 6 ABOUT HERE

INSERT TABLE 23 ABOUT HERE

Reading

Six content area scores were computed from the Reading test: Referring-Prose, Referring-Humanities, Referring-Social Sciences, Reasoning-Prose, Reasoning-Humanities, and Reasoning-Social Sciences. First eigenvalues accounted for 46% to 49% of the variance. Second eigenvalues accounted for 15% to 16%. Scree plots (figure 7) suggested two dimensions. Component loadings given in Table 24 show that the second principal components were defined quite clearly by Prose versus Social Sciences on the 1987 forms (7A and 7BΔ) and by Social Sciences versus everything else on the 1988 forms (8A and 8B). As was the case in the item-level analyses, a dimension related to Referring or Reasoning was not found.

INSERT FIGURE 7 ABOUT HERE

INSERT TABLE 24 ABOUT HERE

Science Reasoning

Three format scores were computed from the Science Reasoning items: Data Representation (DR), Research Summary (RS), and Conflicting Viewpoints (CV): First eigenvalues of the correlation matrices of these scores accounted for 61% to 66% of the variance. Second eigenvalues accounted for 20% to 25%. Scree plots of these values are given in Figure 8. Because only three scores were involved, principal component analyses were not performed.

INSERT FIGURE 8 ABOUT HERE

Summary of Factor and Principal Component Analyses

At the item level, considerable consistency was found between the factor patterns of the different forms. Although the factors may have differed in position and percent of variance accounted for, they nevertheless seemed to replicate across forms. On the other hand, with the exception of Mathematics, there was little if any semblance of the test specifications to be seen in the factor patterns obtained in these analyses. For the most part, the English, Reading and Science Reasoning tests were characterized by general and method factors. The patterns for the Mathematics tests were interpretable in terms of content but not in a manner that was completely consistent with the specifications.

The component analyses also generally failed to replicate the structure implied by the specifications, although content interpretations were possible.

Multidimensional Item Response Theory Analysis

To provide additional insight into the dimensional structure of the different P-ACT+ tests, an item-level analysis was performed using a compensatory MIRT model. Item parameters were estimated using the computer program NOHARM (Fraser, 1985) and then transformed into item vectors (Reckase, 1985). Because of plotting limitations, only the 2-dimensional results are presented.

Figures 9 - 24 provide a visual summary of the results. These figures show the item vectors representing the items in each test. The length of the vector is proportional to the magnitude of the discrimination provided by the item, the location of the tail corresponds with the item's difficulty, and the direction of the vector shows the dimension, or the relative composition of dimensions measured by the item. That is, if a vector is in the direction of the horizontal axis, then the item is primarily measuring the first dimension. Likewise, a vector which is parallel to the vertical axis indicates the item is measuring the second dimension. Items with vectors pointing in directions between the horizontal and vertical axes are measuring a combination of the two dimensions to varying degrees.

In all plots, the two dimensions were constrained in the NOHARM runs to have a correlation of 0.50, and based on inspection of the test items, one item in a test for each form (items which were judged to be measuring the same ability) was selected to load solely on the first dimension. This provided a common orientation of the 2-dimensional spaces to aid in the comparison of the results for a given test across forms.

Inspection of the plots shows the appearance of a second factor in all tests. For the most part, those items with vectors in the direction of the vertical axis were the items located near the end of the test. This again points out the existence of a speededness factor in all tests.

Cluster analyses of item vector angles were carried out on the two-dimensional solutions to determine if the factors identified in the item-level factor analysis could be found. With the English tests, only a speededness factor could be identified as a second factor using the 2-dimensional item vectors. This is consistent with the item-level factor analyses where it was found that the "omit" and "no change" factors accounted for a very small amount of variance in the factor solutions. In the Mathematics tests, it was possible to identify Algebra and Geometry factors, but not with the clarity found in the item-level factor analysis. Finally, the Reading and Science tests did not show anything conclusive beyond that found with the item-level factor analysis. That is, the speededness and passage effects for the Reading tests are confounded, and for the Science tests there does appear to be a second minor factor other than speededness.

INSERT FIGURES 9 - 24 ABOUT HERE

P-Values and Point-Biserials

Table 25 contains the means and standard deviations of the item p-values and point-biserials. Tables 26 - 29 list the individual p-values and point-biserials for each item in every content area by test form.

There is some variation in mean p-values across forms, most of which is due to form 7BΔ which is generally easier than the other forms. With this exception, however, the distributions of the p-values and the point biserial correlations across forms appear very similar.

All of the tests exhibit a pattern of decreasing p-values as items appear near the end. Since the items in each test are ordered by difficulty in the construction process, such a result is certainly expected. However, this trend also supports the possibility of a speededness factor. Inspection of the raw data verified the presence of such a factor, with easily identifiable patterns of omitted responses occurring at the ends of the tests.

INSERT TABLES 25 - 29 ABOUT HERE

Correlations and Internal Consistencies

Intercorrelations and internal consistency reliabilities (KR20) were computed for the test scores and subscores that are currently reported i.e., English, Usage/Mechanics, Rhetorical Skills, Mathematics, Algebra, Geometry, Reading and Science Reasoning. The results are given in Tables 30 - 33. Several things are apparent from these tables. First, the patterns of correlations and levels of internal consistency across forms are highly similar. Second, the overall level of correlations is fairly high between the different subtests. Disattenuated correlations between the Usage/Mechanics and Rhetorical Skills, and between the Algebra and Geometry subscores are, with a few exceptions, in the high .90's.

INSERT TABLES 30 - 33 ABOUT HERE

Stout Test Summary

For each form of the P-ACT+, a test for unidimensionality proposed by Stout (1987) was performed on the four content areas (i.e., English, Mathematics, Reading, and Science Reasoning) using data from the equating administrations. Briefly, this procedure consists of randomly dividing the examinees into two subgroups and conducting a principal axis factor analysis on tetrachoric correlations computed from the data from one subgroup. A two-factor unrotated solution is used to identify those items with substantial loadings on a second factor. The intent is to identify a subset of items that is as unidimensional as possible. The test for unidimensionality involves a comparison of the responses of the other subgroup to the *other* items and their responses to the unidimensional subset of items. This comparison yields a statistical index, T, that indicates the degree of departure from unidimensionality and that is asymptotically normally distributed when unidimensionality holds. In the present analyses as a check for consistency in the results the Stout Test was performed a second time on all tests with the roles of the two subgroups reversed. These results are presented in Table 34.

INSERT TABLE 34 ABOUT HERE

With the exception of the Science Reasoning test in forms 7A and 8B, the T-values from the Stout Test were significant beyond .05 and therefore indicate that the other content areas in each form of the P-ACT+, as well as Science Reasoning in forms 7BΔ and 8A, have more than one dimension. One further exception may be seen in the Mathematics test, form 8A, where a reversal occurred in results of the first run of the Stout Test and the second run, with the latter failing to reject the hypothesis of unidimensionality.

Summary and Conclusions

In general, the different forms of the P-ACT+ appear to be multidimensional. Although it is clear that a single factor is dominant in each test, there nevertheless seems to be enough evidence of multidimensionality to question the appropriateness of a unidimensional IRT model for these data. On the other hand, the dimensional structures were quite similar across forms. To the extent that these structures are equivalent, a unidimensional IRT model may still be feasible since it would provide comparable ability estimates across forms. Further analyses directed toward this issue are included in the companion paper "Assessing the Appropriateness of the Unidimensional IRT Model for Estimating Content Area Scores".

Several other important findings were brought out in these analyses. First, with the exception of Mathematics, there was almost no correspondence between the factor structures and the test specifications. Also, the level of correlations between the various subtests indicates a considerable degree of statistical overlap. This is not to say that content-related scores would not be useful, but rather these findings should serve to

caution against misinterpretation of such scores as distinct, non-overlapping pieces of information.

The dimensional structures of the Mathematics tests were clearly the most interpretable in terms of content, and to some extent the factor patters conformed to the test specifications. The Mathematics tests were also the most multidimensional in the sense that the variance accounted for was more spread out among the factors.

Somewhat disconcerting was the presence of the method factors. The strongest of such factors were the speededness factors in the English tests. Although these factors are probably confounded to some extent with the increased difficulty of the items near the ends of the tests, visual inspection of the 0/1 response vectors clearly indicates the presence of speededness. The other method factors, such as the "omit" factors were quite small but their mere presence should warrant further consideration.

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Table 1

Structure Loadings from a DAPPFR Rotation of the First Six Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the English Test (Form 7A)

	Factor					
Item No.	1	2	3	4	5	6
1	0.18	0.03	0.26	-0.02	-0.02	0.01
2	0.09	0.05	0.25	0.24	-0.03	0.04
3	0.22	0.04	0.20	0.04	0.01	-0.07
4	0.42	-0.04	0.12	-0.01	-0.02	-0.15
5	0.34	0.05	0.23	-0.11	-0.05	0.02
6	0.34	0.09	0.01	0.04	0.01	0.02
7	0.46	-0.06	0.21	0.04	-0.07	-0.00
8	0.02	-0.00	0.51	0.20	0.01	0.16
9	-0.01	-0.09	0.49	0.05	0.01	0.01
10	0.16	-0.03	0.24	-0.05	0.13	0.32
11	0.24	0.01	0.29	-0.08	0.03	0.02
12	0.18	-0.02	0.12	0.04	0.10	-0.04
13	0.01	-0.12	0.32	0.19	0.12	0.11
14	0.23	0.01	0.09	-0.05	0.13	-0.19
15	0.02	-0.04	0.25	0.12	0.12	-0.06
16	0.20	-0.03	0.17	0.03	0.13	0.26
17	0.35	-0.00	0.11	0.03	-0.01	0.23
18	-0.02	0.02	0.12	0.30	0.07	0.06
19	0.31	-0.01	0.12	-0.00	0.08	-0.05
20	0.22	0.06	0.24	-0.06	0.00	0.19
21	0.23	-0.00	0.00	0.24	0.04	-0.02
22	0.16	0.00	0.22	-0.03	0.08	0.09
23	0.44	0.04	0.02	0.11	-0.00	-0.02
24	0.12	-0.10	0.00	0.18	0.24	-0.14
25	0.09	-0.13	0.08	0.09	0.27	-0.04
26	0.02	0.00	0.00	-0.00	0.31	-0.09
27	0.27	-0.02	-0.07	-0.04	0.16	0.05
28	-0.02	-0.03	0.03	0.06	0.30	0.19
29	0.15	-0.00	0.09	-0.05	0.21	0.16
30	0.09	0.01	0.08	0.21	0.28	0.18

(table continues)

	Factor					
Item No.	1	2	3	4	5	6
31	0.02	0.02	-0.02	-0.09	0.30	0.06
32	-0.00	-0.00	-0.03	0.06	0.43	0.08
33	0.15	0.11	-0.07	0.31	0.17	-0.10
34	0.05	0.08	-0.02	0.01	0.28	0.08
35	-0.11	0.02	0.02	-0.03	0.38	-0.05
36	0.13	0.06	-0.01	-0.14	0.24	-0.00
37	0.08	0.13	-0.06	0.23	0.21	0.04
38	-0.12	0.12	-0.17	-0.02	0.43	-0.01
39	-0.02	0.21	0.04	0.00	0.28	-0.01
40	-0.01	0.40	0.09	0.28	0.11	0.02
41	0.01	0.25	-0.01	0.12	0.12	-0.17
42	-0.05	0.33	0.01	0.23	0.19	-0.06
43	0.07	0.36	0.05	-0.02	-0.00	-0.08
44	0.08	0.47	-0.01	0.02	0.06	-0.03
45	0.19	0.33	0.01	0.01	0.03	-0.17
46	0.06	0.51	0.00	0.36	0.01	0.03
47	0.00	0.52	0.08	0.02	-0.01	0.02
48	0.10	0.40	0.02	-0.03	0.01	-0.16
49	0.18	0.44	-0.04	0.01	0.01	0.01
50	0.00	0.34	-0.01	0.37	-0.01	-0.04

Factor Intercorrelation Matrix

	Factor					
Factor	1	2	3	4	5	6
1	1.00	0.37	0.46	0.10	0.70	0.01
2	0.37	1.00	0.41	-0.11	0.54	-0.05
3	0.46	0.41	1.00	-0.01	0.76	-0.18
4	0.10	-0.11	-0.01	1.00	0.06	0.05
5	0.70	0.54	0.76	0.06	1.00	-0.10
6	0.01	-0.05	-0.18	0.05	-0.10	1.00

N = 1772

Table 2

Structure Loadings from a DAPPFR Rotation of the First Six Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the English Test (Form 7B)

	Factor					
Item No.	1	2	3	4	5	6
1	0.33	0.10	0.25	0.05	0.29	0.01
2	0.31	0.02	0.01	-0.04	0.37	-0.00
3	0.30	0.07	-0.08	-0.05	0.13	0.01
4	0.23	0.18	-0.02	0.32	0.24	-0.02
5	0.31	-0.01	-0.05	-0.08	0.05	-0.00
6	0.33	-0.03	-0.05	-0.05	0.04	-0.04
7	0.42	-0.03	-0.01	0.35	0.04	0.03
8	0.28	0.11	-0.05	0.31	0.21	0.02
9	0.38	0.00	0.14	0.32	-0.05	-0.04
10	0.42	-0.01	0.14	0.03	-0.03	-0.01
11	0.34	-0.03	0.38	-0.02	-0.07	0.02
12	0.34	-0.01	-0.10	0.18	-0.07	0.06
13	0.19	0.01	0.05	0.33	0.18	0.17
14	0.29	0.13	0.00	0.06	0.14	0.02
15	0.39	0.04	0.02	0.34	-0.04	-0.01
16	0.30	-0.14	-0.16	0.05	-0.14	0.21
17	0.50	0.04	-0.02	0.05	-0.22	0.01
18	0.40	0.00	-0.10	0.23	0.04	0.08
19	0.49	0.04	0.07	0.01	-0.04	-0.10
20	0.24	0.05	0.01	0.00	0.06	0.06
21	0.28	0.04	-0.03	-0.02	0.05	-0.00
22	0.26	-0.04	0.05	0.10	-0.00	0.16
23	0.44	0.00	0.35	-0.05	0.20	0.01
24	0.38	-0.08	0.07	-0.11	-0.02	0.08
25	0.33	-0.04	0.20	0.07	0.18	0.12
26	0.34	-0.01	0.11	0.06	0.12	0.13
27	0.34	0.00	0.36	-0.13	0.05	-0.05
28	0.43	-0.03	0.09	0.14	0.17	0.11
29	0.30	-0.01	-0.13	0.19	0.05	0.11
30	0.29	0.04	0.21	-0.04	-0.05	0.02

(table continues)

	Factor					
Item No.	1	2	3	4	5	6
31	0.13	0.00	0.01	0.16	0.08	0.22
32	0.29	0.00	0.12	-0.03	0.17	0.17
33	0.21	-0.06	-0.00	0.03	-0.01	0.32
34	0.16	-0.00	-0.05	-0.06	-0.05	0.30
35	0.12	0.01	0.29	-0.08	0.07	0.26
36	0.09	-0.03	0.01	-0.04	-0.19	0.29
37	0.04	0.05	0.12	-0.05	-0.05	0.25
38	0.04	0.03	-0.01	0.22	0.15	0.38
39	-0.04	0.05	0.01	0.11	-0.08	0.41
40	0.00	0.08	0.42	0.04	0.04	0.29
41	-0.03	0.11	-0.00	0.00	-0.01	0.36
42	-0.01	0.24	-0.07	-0.04	-0.16	0.27
43	0.05	0.34	0.02	0.06	-0.29	0.21
44	0.03	0.39	-0.04	-0.08	0.02	0.10
45	0.07	0.27	0.13	0.07	0.18	0.15
46	-0.00	0.30	0.22	0.01	0.14	0.11
47	0.01	0.39	0.02	0.20	0.03	0.16
48	-0.01	0.58	0.00	-0.01	-0.03	0.01
49	-0.04	0.57	0.34	-0.01	-0.01	0.01
50	0.03	0.51	0.05	0.00	-0.18	0.01

Factor Intercorrelation Matrix

	Factor					
Factor	1	2	3	4	5	6
1	1.00	0.55	-0.07	0.10	-0.08	0.73
2	0.55	1.00	-0.02	0.08	-0.05	0.68
3	-0.07	-0.02	1.00	0.27	-0.23	0.01
4	0.10	0.08	0.27	1.00	-0.11	0.08
5	-0.08	-0.05	-0.23	-0.11	1.00	-0.02
6	0.73	0.68	0.01	0.08	-0.02	1.00

N = 1635

Table 3

Structure Loadings from a DAPPFR Rotation of the First Six Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the English Test (Form 8A)

	Factor					
Item No.	1	2	3	4	5	6
1	0.18	0.00	0.10	0.24	0.00	0.17
2	0.06	-0.07	0.02	-0.03	0.26	0.21
3	0.10	-0.08	0.15	0.20	0.15	-0.12
4	-0.18	0.00	0.00	0.14	0.04	0.11
5	0.08	-0.04	0.41	-0.02	0.02	0.02
6	0.04	0.03	0.15	0.01	0.25	-0.09
7	-0.06	-0.02	-0.02	0.41	-0.01	0.04
8	0.07	-0.00	-0.03	0.38	0.11	0.07
9	0.00	0.04	0.01	0.37	0.08	0.01
10	0.22	0.05	0.06	0.15	0.17	-0.12
11	0.10	0.01	0.10	0.39	0.01	-0.05
12	0.25	-0.04	0.13	0.02	0.20	-0.03
13	-0.06	-0.09	0.27	0.01	0.18	0.04
14	-0.01	-0.04	0.11	0.21	0.17	-0.19
15	-0.03	-0.14	-0.19	-0.02	0.45	-0.01
16	0.31	-0.00	-0.03	0.02	0.26	0.05
17	0.33	0.01	0.00	0.27	0.08	0.00
18	0.05	-0.06	-0.01	0.19	0.27	0.19
19	0.04	-0.00	0.07	0.42	0.01	-0.01
20	0.17	-0.02	0.14	0.15	0.13	-0.05
21	-0.04	-0.04	0.16	0.04	0.17	-0.00
22	0.14	0.05	0.43	0.04	-0.07	0.03
23	-0.01	-0.04	-0.02	0.03	0.30	0.21
24	-0.05	-0.00	0.01	0.06	0.24	0.02
25	-0.02	-0.02	0.13	0.12	0.22	0.03
26	0.10	0.04	0.01	-0.05	0.17	-0.01
27	0.15	0.03	0.05	0.01	0.27	0.12
28	-0.25	0.04	-0.00	0.21	0.25	0.22
29	-0.03	0.02	0.16	-0.01	0.01	0.41
30	0.01	0.02	0.43	0.10	0.08	0.01

(table continues)

	Factor					
Item No.	1	2	3	4	5	6
31	-0.02	0.05	0.13	0.24	0.21	-0.14
32	-0.23	0.10	0.47	0.16	-0.01	-0.06
33	-0.10	0.01	0.01	-0.10	0.26	0.37
34	-0.14	-0.02	0.19	0.13	0.18	-0.13
35	0.22	0.10	0.04	0.01	0.22	0.05
36	0.07	0.07	0.01	0.02	0.25	0.10
37	-0.06	0.03	0.13	-0.09	0.29	0.12
38	0.01	0.16	0.54	-0.04	-0.01	-0.10
39	0.23	0.13	-0.08	-0.01	0.33	-0.05
40	-0.10	0.33	0.28	0.00	0.03	0.02
41	-0.00	0.34	-0.02	-0.02	0.27	-0.06
42	0.04	0.21	-0.01	-0.25	0.39	0.07
43	-0.25	0.44	0.02	0.03	-0.01	0.31
44	-0.03	0.52	-0.01	0.03	0.08	-0.01
45	0.03	0.47	0.05	-0.00	0.02	0.04
46	0.11	0.30	0.10	0.06	-0.02	0.03
47	0.16	0.41	-0.05	-0.07	0.10	-0.05
48	-0.03	0.63	0.02	0.14	-0.09	-0.03
49	0.00	0.69	-0.09	0.19	-0.13	0.04
50	0.09	0.57	-0.10	-0.02	0.01	0.12

Factor Intercorrelation Matrix

	Factor					
Factor	1	2	3	4	5	6
1	1.00	0.10	0.13	0.08	0.06	0.16
2	0.10	1.00	0.44	0.40	0.61	0.15
3	0.13	0.44	1.00	0.46	0.57	0.25
4	0.08	0.40	0.46	1.00	0.71	0.32
5	0.06	0.61	0.57	0.71	1.00	0.24
6	0.16	0.15	0.25	0.32	0.24	1.00

N = 1669

Table 4

Structure Loadings from a DAPPFR Rotation of the First Six Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the English Test (Form 8B)

	Factor					
Item No.	1	2	3	4	5	6
1	0.41	-0.01	0.01	0.03	-0.17	-0.21
2	0.33	0.01	0.02	-0.04	0.17	0.09
3	0.21	-0.01	-0.02	0.37	-0.30	0.13
4	0.38	-0.05	0.21	0.01	-0.13	-0.02
5	0.14	-0.02	0.19	0.01	-0.13	-0.03
6	0.18	0.05	0.05	0.13	0.10	-0.25
7	0.50	0.01	-0.18	0.03	0.06	-0.02
8	0.55	-0.00	-0.34	-0.02	-0.05	-0.19
9	0.41	0.01	-0.09	-0.01	0.09	-0.01
10	0.30	-0.04	0.11	0.05	-0.04	-0.04
11	0.19	-0.05	0.09	0.13	0.08	-0.01
12	0.20	0.03	0.07	0.05	0.00	0.24
13	0.43	-0.03	-0.05	-0.00	0.03	0.01
14	0.09	-0.01	0.33	0.14	-0.11	0.02
15	0.42	0.01	-0.03	0.02	-0.05	-0.08
16	0.40	-0.03	-0.05	-0.05	-0.01	-0.13
17	0.40	-0.01	0.13	-0.06	-0.00	-0.03
18	0.35	-0.01	0.04	0.23	-0.08	-0.06
19	0.29	-0.00	0.12	0.04	0.05	-0.31
20	0.50	0.01	0.05	-0.02	-0.22	0.05
21	0.34	0.03	0.14	-0.03	-0.09	0.07
22	0.22	-0.04	-0.00	0.41	0.04	0.07
23	0.37	0.06	-0.01	-0.00	-0.11	0.19
24	0.43	-0.03	-0.03	0.14	0.01	0.20
25	0.23	0.04	0.01	0.47	-0.02	0.04
26	-0.01	0.01	0.15	-0.01	0.02	0.03
27	0.14	-0.10	0.22	-0.05	0.19	0.03
28	0.20	0.06	0.26	0.06	0.04	-0.04
29	0.00	0 03	0.12	0.30	-0.01	-0.08
30	0.28	0.05	0.05	0.13	0.14	-0.23

(table continues)

	Factor					
Item No.	1	2	3	4	5	6
31	0.24	0.03	0.23	0.12	0.03	0.03
32	0.18	0.13	0.10	-0.15	0.20	-0.00
33	0.22	0.13	-0.03	0.06	0.29	-0.01
34	0.02	0.16	0.16	0.41	0.16	-0.02
35	0.05	0.15	0.12	0.07	0.17	0.04
36	0.02	0.20	0.01	0.28	0.30	0.01
37	0.11	0.23	0.03	0.07	0.17	0.20
38	0.19	0.25	0.02	-0.11	0.12	-0.02
39	0.14	0.20	0.12	-0.12	0.02	0.05
40	0.02	0.30	0.20	0.01	0.09	-0.03
41	0.02	0.23	0.31	-0.03	0.03	-0.15
42	0.18	0.41	-0.05	-0.12	0.00	-0.24
43	-0.00	0.30	0.37	0.02	-0.06	-0.04
44	0.00	0.62	0.04	-0.03	0.03	0.05
45	0.02	0.61	0.01	0.03	-0.01	-0.17
46	-0.03	0.72	-0.10	0.13	0.04	-0.05
47	0.02	0.71	-0.02	0.00	-0.06	0.05
48	-0.02	0.50	0.06	-0.02	0.11	-0.05
49	-0.02	0.58	0.16	-0.02	-0.04	0.01
50	-0.15	0.73	-0.05	0.12	0.03	0.00

Factor Intercorrelation Matrix

	Factor					
Factor	1	2	3	4	5	6
1	1.00	0.57	0.59	0.52	0.47	-0.08
2	0.57	1.00	0.40	0.32	0.27	-0.11
3	0.59	0.40	1.00	0.27	0.34	-0.12
4	0.52	0.32	0.27	1.00	0.25	-0.11
5	0.47	0.27	0.34	0.25	1.00	-0.01
6	-0.08	-0.11	-0.12	-0.11	-0.01	1.00

N = 1611

Table 5

Structure Loadings from a DAPPFR Rotation of the First Four Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Mathematics Test (Form 7A)

	Factor			
Item No.	1	2	3	4
1	0.37	-0.16	-0.01	0.00
2	0.04	-0.15	0.36	0.03
3	0.16	0.02	0.21	0.01
4	0.38	-0.15	0.06	0.06
5	0.04	0.00	0.12	0.23
6	0.19	-0.12	0.27	0.07
7	0.02	-0.17	0.40	-0.05
8	0.40	-0.02	0.06	-0.06
9	0.14	-0.03	0.30	-0.04
10	-0.03	-0.09	0.44	0.08
11	0.14	0.00	0.26	0.05
12	0.01	0.05	0.37	0.00
13	0.14	0.01	0.18	-0.00
14	0.40	-0.04	0.03	0.01
15	0.21	0.03	0.13	-0.08
16	0.00	0.01	0.35	-0.03
17	-0.02	0.11	0.28	-0.14
18	0.12	-0.01	0.21	-0.02
19	0.16	0.14	0.17	-0.03
20	0.51	0.01	-0.04	-0.15
21	0.27	0.12	0.05	-0.07
22	-0.04	0.06	0.15	0.02
23	0.02	0.17	0.14	-0.10
24	0.26	0.19	-0.04	0.04
25	0.13	0.30	0.16	-0.09
26	0.14	0.09	0.06	0.06
27	0.44	0.20	-0.08	-0.01
28	0.22	0.01	-0.00	0.25
29	0.36	0.04	-0.05	0.03
30	-0.07	0.27	0.13	-0.05

(table continues)

	Factor			
Item No.	1	2	3	4
31	0.02	0.17	0.08	0.03
32	0.02	<u>0.37</u>	0.14	0.09
33	-0.01	0.19	-0.00	<u>0.34</u>
34	0.13	<u>0.35</u>	0.11	0.02
35	0.11	<u>0.37</u>	-0.00	0.13
36	0.01	<u>0.44</u>	0.04	0.12
37	-0.01	0.22	0.15	<u>0.41</u>
38	0.02	0.28	0.08	<u>0.29</u>
39	0.18	0.31	-0.16	0.21
40	-0.01	<u>0.40</u>	-0.02	0.03

Factor Intercorrelation Matrix

	Factor			
Factor	1	2	3	4
1	1.00	0.42	0.79	0.15
2	0.42	1.00	0.45	0.03
3	0.79	0.45	1.00	0.16
4	0.15	0.03	0.16	1.00

N = 1772

Table 6

Structure Loadings from a DAPPFR Rotation of the First Four Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Mathematics Test (Form 7B)

	Factor			
Item No.	1	2	3	4
1	0.03	-0.01	0.61	0.01
2	0.31	-0.06	0.28	0.03
3	0.21	0.03	0.33	-0.04
4	0.05	0.01	0.36	0.15
5	0.06	0.17	0.26	-0.08
6	0.18	0.14	0.16	0.04
7	0.20	0.05	0.31	0.02
8	0.02	-0.02	0.59	0.04
9	0.16	0.09	0.35	0.02
10	-0.01	0.19	0.35	0.07
11	0.03	0.10	0.48	-0.04
12	-0.08	0.09	0.42	0.14
13	-0.07	0.33	0.42	-0.05
14	0.24	0.15	0.03	0.02
15	0.19	0.13	0.04	0.05
16	0.35	0.05	0.09	-0.08
17	-0.01	0.30	0.41	-0.02
18	0.20	0.33	0.05	-0.08
19	0.11	0.12	0.20	0.04
20	0.14	0.23	0.04	0.13
21	-0.01	0.01	0.04	0.44
22	0.05	0.08	-0.02	0.35
23	0.27	0.19	0.01	-0.01
24	-0.07	0.33	0.22	-0.01
25	0.02	0.42	-0.06	-0.06
26	0.06	0.25	0.00	0.02
27	0.04	0.39	-0.02	0.01
28	0.02	0.02	0.16	0.45
29	0.05	0.23	0.03	0.20
30	0.15	0.26	-0.06	0.08

(table continues)

Item No.	Factor 1	2	3	4
31	0.05	0.24	-0.09	0.22
32	-0.05	0.45	-0.00	0.04
33	-0.22	0.23	0.04	0.23
34	-0.02	0.23	0.02	0.03
35	-0.02	0.36	-0.16	0.20
36	-0.05	0.09	-0.02	0.32
37	0.03	0.28	-0.09	0.10
38	0.06	0.29	-0.13	-0.02
39	-0.02	0.30	-0.16	0.02
40	-0.17	0.31	0.02	0.13

Factor Intercorrelation Matrix

Factor	Factor 1	2	3	4
1	1.00	0.48	0.32	0.64
2	0.48	1.00	0.60	0.68
3	0.32	0.60	1.00	0.59
4	0.64	0.68	0.59	1.00

N = 1635

Table 7

Structure Loadings from a DAPPFR Rotation of the First Four Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Mathematics Test (Form 8A)

	Factor			
Item No.	1	2	3	4
1	0.37	-0.01	0.12	-0.07
2	0.41	0.02	-0.08	0.12
3	0.23	-0.04	0.36	-0.02
4	0.49	-0.03	0.15	-0.02
5	0.26	-0.04	0.35	0.06
6	0.38	-0.02	0.22	-0.06
7	0.47	0.12	-0.03	0.03
8	0.25	0.01	0.32	0.03
9	0.33	0.05	0.04	0.07
10	0.12	0.05	0.35	-0.06
11	0.23	0.14	0.02	0.03
12	0.38	0.05	0.22	-0.06
13	0.17	0.15	0.29	0.04
14	0.04	0.05	0.25	0.15
15	0.35	-0.05	0.26	0.07
16	0.43	0.05	0.04	0.17
17	0.16	-0.02	0.05	0.25
18	0.05	-0.04	0.09	0.27
19	0.09	0.19	0.04	0.14
20	0.04	0.14	0.27	0.03
21	0.21	0.22	0.02	-0.12
22	0.27	0.23	0.12	-0.12
23	0.09	0.04	0.20	0.16
24	0.21	0.07	-0.04	0.05
25	-0.01	0.16	0.40	-0.26
26	0.08	0.19	-0.02	-0.01
27	-0.02	0.04	0.42	0.14
28	-0.02	0.33	0.03	0.16
29	-0.03	0.15	0.43	0.05
30	0.05	0.28	0.28	-0.20

(table continues)

	Factor			
Item No.	1	2	3	4
31	0.20	0.25	0.02	0.03
32	0.09	0.32	0.26	-0.07
33	-0.14	0.49	0.03	-0.00
34	-0.02	0.52	-0.02	0.07
35	-0.12	0.42	-0.11	0.26
36	0.10	0.44	-0.11	-0.08
37	0.05	0.22	-0.05	0.15
38	-0.04	0.28	0.03	-0.00
39	0.02	0.52	-0.19	-0.01
40	-0.23	0.28	-0.01	0.26

Factor Intercorrelation Matrix

	Factor			
Factor	1	2	3	4
1	1.00	0.60	0.57	0.25
2	0.60	1.00	0.56	0.29
3	0.57	0.56	1.00	0.35
4	0.25	0.29	0.35	1.00

N = 1669

Table 8

Structure Loadings from a DAPPFR Rotation of the First Four Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Mathematics Test (Form 8B)

	Factor			
Item No.	1	2	3	4
1	0.01	-0.15	0.26	0.38
2	0.21	-0.06	0.04	0.04
3	-0.03	-0.14	0.48	0.04
4	0.09	0.04	0.18	-0.00
5	0.06	0.01	0.14	0.38
6	-0.05	0.05	0.23	0.42
7	0.37	-0.07	-0.00	0.20
8	0.20	0.01	0.05	0.18
9	0.05	-0.02	0.20	0.08
10	-0.02	0.00	0.27	0.11
11	-0.00	-0.11	0.21	0.15
12	0.03	0.04	0.27	0.18
13	0.42	-0.06	0.02	0.04
14	0.04	0.04	0.11	0.07
15	0.26	-0.10	0.23	-0.06
16	0.39	-0.02	-0.00	0.14
17	0.53	0.01	-0.15	0.11
18	0.38	0.07	0.01	-0.03
19	0.43	0.07	-0.05	-0.05
20	0.05	-0.01	0.23	0.01
21	0.46	0.09	-0.10	-0.00
22	0.18	0.02	0.14	0.24
23	0.04	-0.03	0.28	0.30
24	-0.09	-0.02	0.37	-0.01
25	0.26	0.18	-0.01	-0.01
26	-0.05	0.07	0.03	0.19
27	0.12	-0.02	0.24	0.06
28	-0.03	-0.03	0.53	-0.04
29	0.22	0.09	0.18	0.07
30	0.07	0.13	0.28	0.08

(table continues)

Item No.	Factor 1	2	3	4
31	-0.20	0.04	<u>0.52</u>	-0.05
32	0.17	0.33	0.04	-0.05
33	-0.03	0.27	0.21	-0.03
34	0.03	<u>0.34</u>	0.34	-0.21
35	0.32	<u>0.34</u>	0.00	-0.01
36	-0.00	<u>0.48</u>	-0.01	0.04
37	0.14	0.26	0.06	0.03
38	0.09	<u>0.44</u>	-0.02	0.09
39	-0.07	0.31	<u>0.36</u>	-0.18
40	0.02	<u>0.38</u>	0.13	-0.00

Factor Intercorrelation Matrix

Factor	Factor 1	2	3	4
1	1.00	0.14	0.74	0.31
2	0.14	1.00	0.25	0.28
3	0.74	0.25	1.00	0.38
4	0.31	0.28	0.38	1.00

N = 1611

Table 9

Structure Loadings from a DAPPFR Rotation of the First Three Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Reading Test (Form 7A)

	Factor		
Item No.	1	2	3
1	0.31	0.04	0.13
2	0.57	0.02	-0.01
3	0.37	0.00	0.04
4	0.57	-0.06	0.02
5	0.63	0.00	-0.03
6	0.14	-0.17	0.12
7	0.20	-0.09	0.25
8	0.29	0.08	0.07
9	0.07	-0.03	0.31
10	0.20	0.10	0.13
11	0.10	0.04	0.32
12	0.01	-0.06	0.34
13	0.02	0.03	0.34
14	0.00	0.13	0.31
15	0.00	0.06	0.23
16	-0.07	0.14	0.29
17	0.17	0.30	0.17
18	0.21	0.41	0.00
19	0.14	0.44	0.02
20	-0.02	0.25	0.10
21	0.07	0.37	0.00
22	-0.07	0.50	0.02
23	0.00	0.43	0.10
24	0.02	0.48	0.00
25	0.08	0.40	-0.06

(table continues)

Factor Intercorrelation Matrix

	Factor		
Factor	1	2	3
1	1.00	0.46	0.66
2	0.46	1.00	0.60
3	0.66	0.60	1.00

N = 1772

Table 10

Structure Loadings from a DAPPFR Rotation of the First Three Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Reading Test (Form 7B)

	Factor		
Item No.	1	2	3
1	0.39	-0.03	0.01
2	0.38	0.05	-0.05
3	0.27	0.04	0.04
4	0.31	-0.04	-0.06
5	0.29	-0.16	0.08
6	0.33	0.02	0.03
7	0.32	-0.08	0.06
8	-0.02	-0.11	0.24
9	0.34	-0.03	-0.05
10	0.29	0.05	0.16
11	0.02	0.04	0.28
12	-0.01	0.07	0.21
13	0.06	-0.01	0.31
14	0.00	-0.04	0.38
15	0.12	0.06	0.23
16	-0.19	-0.08	0.38
17	-0.14	0.05	0.40
18	0.25	0.13	-0.00
19	0.10	0.15	0.18
20	0.17	0.21	0.14
21	0.21	0.32	0.03
22	0.03	0.64	0.02
23	0.14	0.65	-0.04
24	-0.06	0.25	0.05
25	0.15	0.23	0.06

(table continues)

Factor Intercorrelation Matrix

	Factor		
Factor	1	2	3
1	1.00	0.37	0.75
2	0.37	1.00	0.55
3	0.75	0.55	1.00

N = 1635

Table 11

Structure Loadings from a DAPPFR Rotation of the First Three Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Reading Test (Form 8A)

	Factor		
Item No.	1	2	3
1	0.48	-0.09	0.05
2	0.49	-0.02	-0.02
3	0.50	-0.02	-0.03
4	0.56	-0.03	-0.07
5	0.41	0.02	0.03
6	0.34	0.02	-0.14
7	0.33	0.02	0.08
8	0.37	0.05	-0.07
9	0.22	-0.01	0.43
10	0.20	0.07	0.28
11	0.24	0.11	0.21
12	0.23	0.00	0.28
13	-0.00	0.09	-0.02
14	0.27	0.17	0.07
15	0.28	0.04	0.05
16	0.26	0.22	-0.27
17	0.13	0.30	0.22
18	0.07	0.39	0.14
19	0.03	0.43	0.20
20	-0.01	0.47	0.23
21	0.03	0.52	0.05
22	0.00	0.45	-0.10
23	-0.03	0.59	-0.00
24	-0.09	0.47	-0.02
25	-0.02	0.12	-0.15

(table continues)

Factor Intercorrelation Matrix

	Factor		
Factor	1	2	3
1	1.00	0.58	0.58
2	0.58	1.00	0.34
3	0.58	0.34	1.00

N = 1669

Table 12

Structure Loadings from a DAPPFR Rotation of the First Three Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Reading Test (Form 8B)

	Factor		
Item No.	1	2	3
1	0.17	0.10	0.14
2	0.43	-0.13	0.15
3	0.29	0.01	0.03
4	0.04	-0.01	0.31
5	0.29	0.09	0.02
6	0.09	-0.07	0.37
7	0.00	0.06	0.40
8	0.42	-0.14	-0.07
9	0.32	0.00	-0.06
10	0.43	-0.04	0.03
11	0.30	-0.01	-0.02
12	0.29	0.08	0.10
13	0.34	-0.02	0.00
14	0.26	0.03	0.05
15	0.11	0.06	0.10
16	0.24	-0.01	0.04
17	0.34	0.14	-0.02
18	0.04	0.27	0.04
19	0.02	0.23	0.01
20	0.21	0.30	0.00
21	-0.13	0.27	0.12
22	-0.04	0.45	0.04
23	0.05	0.46	-0.10
24	-0.14	0.31	-0.00
25	-0.01	0.39	-0.05

(table continues)

Factor Intercorrelation Matrix

	Factor		
Factor	1	2	3
1	1.00	0.66	0.69
2	0.66	1.00	0.49
3	0.69	0.49	1.00

N = 1611

Table 13

Structure Loadings from a DAPPFR Rotation of the First Three Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Science Reasoning Test (Form 7A)

	Factor		
Item No.	1	2	3
1	0.35	-0.00	0.01
2	0.54	-0.01	-0.13
3	0.38	0.02	-0.01
4	0.49	-0.06	-0.00
5	0.14	0.07	0.10
6	0.34	0.01	0.00
7	0.25	0.02	0.04
8	0.09	-0.01	0.24
9	-0.00	-0.06	0.32
10	0.08	0.06	0.09
11	0.04	0.01	0.37
12	0.00	-0.06	0.21
13	0.12	0.01	0.14
14	0.16	0.02	0.21
15	0.12	0.04	0.23
16	0.13	0.02	0.20
17	-0.03	0.04	0.27
18	0.14	0.25	0.00
19	0.11	0.21	0.10
20	0.02	0.19	0.15
21	0.03	0.27	0.04
22	0.10	0.32	-0.06
23	-0.07	0.35	-0.04
24	-0.02	0.33	0.03
25	0.01	0.34	-0.03
26	0.01	0.31	0.07
27	0.03	0.30	-0.11
28	-0.00	0.16	0.02
29	-0.10	0.21	0.05
30	-0.16	0.26	0.10

(table continues)

Factor Intercorrelation Matrix

	Factor		
Factor	1	2	3
1	1.00	0.67	0.75
2	0.67	1.00	0.66
3	0.75	0.66	1.00

N = 1772

Table 14

Structure Loadings from a DAPPER Rotation of the First Three Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Science Reasoning Test (Form 7B)

Item No.	Factor 1	Factor 2	Factor 3
1	0.29	0.01	0.07
2	0.57	0.00	0.45
3	0.37	-0.05	0.55
4	0.42	0.05	0.44
5	0.38	0.02	0.08
6	0.56	-0.07	-0.02
7	0.56	-0.06	-0.13
8	0.66	-0.06	-0.06
9	0.65	0.03	-0.03
10	0.60	-0.00	0.04
11	0.51	0.04	-0.04
12	0.38	0.04	-0.18
13	0.46	0.12	0.07
14	0.42	0.08	0.06
15	0.39	0.03	-0.06
16	0.33	0.17	0.07
17	0.40	0.15	-0.03
18	0.31	0.18	0.12
19	0.26	0.24	0.15
20	0.29	0.24	0.04
21	0.26	0.32	-0.04
22	0.13	0.14	0.01
23	0.02	0.25	0.08
24	0.08	0.39	-0.09
25	0.12	0.32	-0.10
26	-0.04	0.49	-0.06
27	-0.02	0.38	-0.04
28	-0.02	0.33	-0.02
29	0.04	0.39	0.08
30	-0.13	0.35	0.07

(table continues)

Factor Intercorrelation Matrix

	Factor		
Factor	1	2	3
1	1.00	0.48	-0.01
2	0.48	1.00	0.01
3	-0.01	0.01	1.00

N = 1635

Table 15

Structure Loadings from a DAPPFR Rotation of the First Three Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Science Reasoning Test (Form 8A)

	Factor		
Item No.	1	2	3
1	0.41	0.03	-0.12
2	0.50	-0.05	0.03
3	0.36	-0.01	0.00
4	0.49	0.02	0.03
5	0.39	-0.07	0.09
6	0.55	-0.02	0.07
7	0.63	0.01	-0.01
8	0.30	-0.01	0.06
9	0.48	0.07	-0.08
10	0.41	0.11	-0.04
11	0.30	0.16	-0.04
12	0.45	0.10	-0.02
13	0.55	0.11	-0.11
14	0.54	-0.05	0.06
15	0.38	0.19	-0.03
16	0.38	0.19	-0.04
17	0.38	0.16	0.03
18	0.09	0.09	0.08
19	0.43	-0.05	0.27
20	-0.09	0.01	0.12
21	0.31	-0.02	0.35
22	0.07	0.02	0.40
23	-0.07	0.05	0.41
24	0.06	0.06	0.38
25	0.17	0.03	0.25
26	0.11	0.32	0.03
27	-0.06	0.36	0.06
28	-0.00	0.39	0.07
29	0.05	0.46	-0.01
30	-0.17	0.37	-0.00

(table continues)

Factor Intercorrelation Matrix

	Factor		
Factor	1	2	3
1	1.00	0.25	0.31
2	0.25	1.00	0.32
3	0.31	0.32	1.00

N = 1669

Table 16

Structure Loadings from a DAPPFR Rotation of the First Three Factors and the Intercorrelation Matrix from a Principal Factor Analysis of Tetrachoric Correlations for the Science Reasoning Test (Form 8B)

	Factor		
Item No.	1	2	3
1	0.62	-0.00	-0.11
2	0.56	-0.00	-0.02
3	0.63	-0.04	0.04
4	0.49	-0.08	0.02
5	0.43	-0.02	0.01
6	0.39	0.09	-0.06
7	0.36	0.08	-0.07
8	0.46	-0.02	0.04
9	0.36	0.10	0.00
10	0.15	0.16	0.05
11	0.35	0.03	0.05
12	0.24	0.01	0.18
13	0.22	0.17	-0.04
14	-0.01	-0.02	0.22
15	0.32	-0.03	0.32
16	0.15	0.05	0.25
17	0.22	-0.03	0.35
18	0.07	0.06	0.34
19	-0.09	0.03	0.24
20	0.23	0.17	0.35
21	0.03	0.26	0.04
22	0.18	0.33	0.30
23	0.02	0.22	0.31
24	0.16	0.27	0.28
25	-0.04	0.25	0.16
26	0.17	0.36	-0.05
27	0.05	0.40	-0.09
28	-0.05	0.46	0.05
29	-0.01	0.37	0.01
30	0.02	0.23	0.03

(table continues)

Factor Intercorrelation Matrix

	Factor		
Factor	1	2	3
1	1.00	0.23	0.47
2	0.23	1.00	0.22
3	0.47	0.22	1.00

N = 1611

Table 17

Variance Accounted for by Factors in English Test Forms 7A, 7B, 8A, 8B

Form	Factor	Total Variance	Proportion of Explained Variance	Proportion of Total Variance
Form 7A	1	5.44	.25	.11
	2	2.76	.13	.06
	3	3.13	.14	.06
	4	1.08	.05	.02
	5	8.83	.40	.18
	6	0.67	.03	.01
Total		21.92	**	.44
Form 7B	1	11.12	.49	.22
	2	3.24	.14	.06
	3	1.20	.05	.02
	4	1.07	.05	.02
	5	0.99	.04	.02
	6	5.23	.23	.10
Total		22.84	**	.46
Form 8A	1	0.94	.05	.02
	2	4.68	.24	.09
	3	2.38	.12	.05
	4	3.64	.18	.07
	5	7.24	.37	.14
	6	0.91	.05	.02
Total		19.78	**	.40
Form 8B	1	10.51	.48	.21
	2	6.36	.29	.13
	3	1.84	.08	.04
	4	1.62	.07	.03
	5	0.92	.04	.02
	6	0.70	.03	.01
Total		21.95	**	.44

Table 18

Variance Accounted for by Factors in Mathematics Test Forms 7A, 7B, 8A, 8B

Form	Factor	Total Variance	Proportion of Explained Variance	Proportion of Total Variance
Form 7A	1	6.25	.47	.16
	2	1.91	.15	.05
	3	4.31	.33	.11
	4	0.70	.05	.02
Total		13.17	**	.33
Form 7B	1	1.29	.08	.03
	2	7.08	.44	.18
	3	5.11	.32	.13
	4	2.47	.16	.06
Total		15.95	**	.40
Form 8A	1	5.89	.42	.15
	2	4.23	.31	.11
	3	2.99	.22	.07
	4	0.74	.05	.02
Total		13.86	**	.35
Form 8B	1	4.59	.36	.11
	2	1.39	.11	.03
	3	5.43	.43	.14
	4	1.18	.09	.03
Total		12.59	**	.31

Table 19

Variance Accounted for by Factors in Reading Test Forms 7A, 7B, 8A, 8B

Form	Factor	Total Variance	Proportion of Explained Variance	Proportion of Total Variance
Form 7A	1	3.84	.45	.15
	2	2.91	.34	.12
	3	1.87	.22	.07
Total		8.62	**	.34
Form 7B	1	3.28	.43	.13
	2	1.74	.23	.07
	3	2,63	.34	.11
Total		7.65	**	.31
Form 8A	1	4.81	.54	.19
	2	3.02	.34	.12
	3	1.07	.12	.04
Total		8.89	**	.36
Form 8B	1	4.17	.60	.17
	2	1.87	.27	.07
	3	0.96	.14	.04
Total		7.00	**	.28

Table 20

Variance Accounted for by Factors in Science Reasoning Test Forms 7A, 7B, 8A, 8B

Form	Factor	Total Variance	Proportion of Explained Variance	Proportion of Total Variance
Form 7A	1	3.51	.47	.12
	2	2.23	.30	.07
	3	1.74	.23	.06
Total		7.49	**	.25
Form 7B	1	6.15	.69	.21
	2	1.88	.21	.06
	3	0.86	.10	.03
Total		8.88	**	.30
Form 8A	1	4.74	.70	.16
	2	1.10	.16	.04
	3	0.97	.14	.03
Total		6.80	**	.23
Form 8B	1	4.20	.60	.14
	2	1.26	.18	.04
	3	1.49	.21	.05
Total		6.95	**	.23

Table 21

Eigenvalues of the Correlation Matrices of P-ACT+ Content Areas Scores

English			
		Form	
7A	7B	8A	8B
3.56	3.71	3.32	3.48
.46	.43	.54	.54
.44	.37	.46	.42
.34	.31	.45	.38
.21	.19	.24	.19

Mathematics			
		Form	
7A	7B	8A	8B
2.70	3.04	2.84	2.64
.50	.45	.45	.55
.44	.27	.39	.46
.35	.24	.32	.36

Reading			
		Form	
7A	7B	8A	8B
2.92	2.78	2.96	2.74
.89	.91	.88	.97
.67	.72	.65	.64
.59	.62	.59	.62
.49	.52	.49	.54
.44	.46	.43	.49

Science			
		Form	
7A	7B	8A	8B
1.87	1.99	1.82	1.87
.75	.59	.67	.61
.37	.42	.51	.51

Table 22

Principal Component Loadings for English Content Areas

Form 7A		
Subtest	1	2
Punctuation	.80	.41
Grammar/Usage	.92	.02
Strategy	.80	-.53
Organization	.85	.05
Style	.85	.04

Form 7B		
Subtest	1	2
Punctuation	.83	.33
Grammar/Usage	.92	.11
Strategy	.81	-.55
Organization	.86	.06
Style	.87	.03

Form 8A		
Subtest	1	2
Punctuation	.76	-.63
Grammar/Usage	.90	.02
Strategy	.81	.05
Organization	.81	.19
Style	.79	.32

Form 8B		
Subtest	1	2
Punctuation	.84	.25
Grammar/Usage	.92	.10
Strategy	.75	-.66
Organization	.81	.18
Style	.84	.06

Table 23

Principal Component Loadings for Mathematics Content Areas

Form 7A		
Subtest	1	2
Pre-Algebra	.85	-.19
Elementary Algebra	.84	-.33
Coordinate Geometry	.82	-.04
Plane Geometry	.78	.60

Form 7B		
Subtest	1	2
Pre-Algebra	.89	.17
Elementary Algebra	.90	.22
Coordinate Geometry	.80	-.59
Plane Geometry	.89	.14

Form 8A		
Subtest	1	2
Pre-Algebra	.87	.07
Elementary Algebra	.86	-.03
Coordinate Geometry	.82	-.49
Plane Geometry	.82	.45

Form 8B		
Subtest	1	2
Pre-Algebra	.86	.10
Elementary Algebra	.82	-.14
Coordinate Geometry	.78	-.50
Plane Geometry	.79	.52

Table 24

Principal Component Loadings for P-ACT+ Reading Content Areas

Form 7A		
Subtest	1	2
Referring-Prose	.71	-.39
Referring-Hum.	.69	-.11
Referring-SS	.66	.57
Reasoning-Prose	.67	-.52
Reasoning-Hum.	.69	.09
Reasoning-SS	.75	.35

Form 7B		
Subtest	1	2
Referring-Prose	.61	-.55
Referring-Hum.	.64	.17
Referring-SS	.75	.32
Reasoning-Prose	.63	-.46
Reasoning-Hum.	.77	-.06
Reasoning-SS	.65	.51

Form 8A		
Subtest	1	2
Referring-Prose	.73	-.34
Referring-Hum.	.65	-.30
Referring-SS	.75	.41
Reasoning-Prose	.71	-.31
Reasoning-Hum.	.71	-.07
Reasoning-SS	.65	.63

(table continues)

Form 8B

Subtest	1	2
Referring-Prose	.70	-.13
Referring-Hum.	.77	-.19
Referring-SS	.66	.36
Reasoning-Prose	.71	-.30
Reasoning-Hum.	.74	-.18
Reasoning-SS	.42	.82

Table 25

Means and Standard Deviations of p-values and Point-Biserials for English, Mathematics, Reading, and Science Reasoning Tests

Test Form		p-values		Pt. Biserial Correlations	
Name	Form	Mean	SD	Mean	SD
English Test	7A	0.59	0.13	0.47	0.08
	7B	0.62	0.11	0.47	0.08
	8A	0.55	0.13	0.43	0.07
	8B	0.58	0.13	0.45	0.09
Mathematics Test	7A	0.48	0.15	0.41	0.11
	7B	0.54	0.15	0.45	0.10
	8A	0.44	0.14	0.42	0.11
	8B	0.43	0.14	0.39	0.09
Reading Test	7A	0.49	0.15	0.44	0.09
	7B	0.53	0.14	0.41	0.09
	8A	0.49	0.14	0.44	0.13
	8B	0.46	0.11	0.41	0.10
Science Reas. Test	7A	0.42	0.09	0.38	0.09
	7B	0.45	0.13	0.40	0.10
	8A	0.39	0.12	0.34	0.11
	8B	0.39	0.13	0.35	0.10

Table 26

P-values and Point-Biserials for English Tests - Forms 7A, 7B, 8A, 8B

	Form 7A		Form 7B		Form 8A		Form 8B	
Item	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial
1	0.73	0.41	0.61	0.50	0.50	0.41	0.64	0.48
2	0.59	0.37	0.69	0.34	0.56	0.36	0.73	0.44
3	0.66	0.45	0.76	0.37	0.63	0.42	0.77	0.28
4	0.58	0.47	0.39	0.43	0.51	0.23	0.48	0.52
5	0.53	0.50	0.73	0.31	0.50	0.32	0.50	0.27
6	0.52	0.43	0.76	0.27	0.54	0.45	0.54	0.46
7	0.46	0.51	0.63	0.55	0.59	0.36	0.84	0.46
8	0.85	0.48	0.60	0.49	0.68	0.50	0.90	0.33
9	0.86	0.38	0.66	0.46	0.75	0.47	0.62	0.48
10	0.69	0.56	0.71	0.46	0.40	0.44	0.56	0.43
11	0.71	0.54	0.74	0.40	0.68	0.47	0.51	0.38
12	0.56	0.45	0.77	0.46	0.41	0.38	0.51	0.34
13	0.79	0.43	0.54	0.50	0.68	0.38	0.61	0.49
14	0.57	0.52	0.54	0.47	0.70	0.41	0.51	0.37
15	0.82	0.40	0.64	0.52	0.59	0.32	0.70	0.49
16	0.55	0.55	0.88	0.38	0.37	0.40	0.63	0.42
17	0.50	0.43	0.85	0.53	0.49	0.43	0.57	0.54
18	0.58	0.28	0.64	0.59	0.73	0.51	0.77	0.52
19	0.63	0.54	0.79	0.43	0.76	0.44	0.61	0.52
20	0.58	0.48	0.56	0.40	0.45	0.42	0.79	0.49
21	0.45	0.33	0.59	0.36	0.64	0.35	0.63	0.47
22	0.71	0.49	0.68	0.48	0.33	0.34	0.73	0.45
23	0.42	0.47	0.58	0.52	0.48	0.44	0.44	0.43
24	0.57	0.47	0.81	0.40	0.69	0.38	0.74	0.51
25	0.64	0.53	0.56	0.51	0.65	0.49	0.83	0.49
26	0.74	0.50	0.64	0.55	0.46	0.26	0.37	0.14
27	0.49	0.44	0.56	0.34	0.58	0.48	0.30	0.31
28	0.70	0.46	0.55	0.62	0.80	0.52	0.54	0.54
29	0.63	0.55	0.49	0.49	0.54	0.28	0.50	0.30
30	0.70	0.61	0.65	0.41	0.61	0.53	0.69	0.56
31	0.68	0.46	0.46	0.46	0.72	0.56	0.61	0.55
32	0.70	0.63	0.66	0.53	0.74	0.49	0.58	0.41
33	0.44	0.45	0.67	0.58	0.44	0.36	0.70	0.50
34	0.62	0.53	0.59	0.54	0.65	0.43	0.66	0.56

(table continues)

Item	Form 7A		Form 7B		Form 8A		Form 8B	
	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial
35	0.72	0.51	0.60	0.47	0.51	0.46	0.59	0.39
36	0.59	0.52	0.64	0.44	0.40	0.45	0.61	0.49
37	0.46	0.46	0.59	0.41	0.42	0.44	0.55	0.43
38	0.62	0.47	0.51	0.59	0.58	0.44	0.41	0.44
39	0.60	0.59	0.68	0.51	0.38	0.46	0.36	0.36
40	0.65	0.54	0.52	0.48	0.65	0.48	0.50	0.46
41	0.41	0.37	0.60	0.51	0.68	0.53	0.41	0.45
42	0.59	0.52	0.60	0.52	0.42	0.44	0.48	0.48
43	0.48	0.36	0.66	0.61	0.58	0.44	0.36	0.47
44	0.56	0.46	0.56	0.46	0.60	0.51	0.58	0.51
45	0.33	0.44	0.47	0.52	0.44	0.46	0.52	0.54
46	0.43	0.43	0.40	0.41	0.31	0.37	0.56	0.56
47	0.52	0.41	0.55	0.57	0.33	0.35	0.53	0.54
48	0.43	0.40	0.57	0.49	0.51	0.51	0.48	0.47
49	0.43	0.43	0.55	0.48	0.54	0.49	0.48	0.51
50	0.32	0.25	0.47	0.48	0.48	0.43	0.57	0.44

Table 27

P-values and Point-Biserials for Mathematics Tests - Forms 7A, 7B, 8A, 8B

	Form 7A		Form 7B		Form 8A		Form 8B	
Item	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial
1	0.67	0.38	0.85	0.47	0.69	0.41	0.73	0.44
2	0.76	0.41	0.83	0.38	0.57	0.39	0.51	0.30
3	0.63	0.48	0.75	0.40	0.67	0.48	0.69	0.49
4	0.69	0.47	0.74	0.51	0.68	0.53	0.66	0.35
5	0.65	0.27	0.67	0.37	0.67	0.52	0.54	0.44
6	0.68	0.51	0.62	0.47	0.70	0.49	0.62	0.44
7	0.55	0.45	0.71	0.47	0.58	0.54	0.54	0.47
8	0.63	0.55	0.76	0.51	0.50	0.55	0.55	0.38
9	0.50	0.54	0.71	0.52	0.57	0.43	0.53	0.35
10	0.63	0.49	0.60	0.58	0.40	0.46	0.55	0.39
11	0.58	0.52	0.79	0.47	0.47	0.40	0.46	0.32
12	0.60	0.51	0.74	0.53	0.58	0.57	0.50	0.47
13	0.61	0.43	0.57	0.63	0.40	0.56	0.48	0.49
14	0.66	0.52	0.55	0.39	0.39	0.38	0.42	0.26
15	0.53	0.45	0.57	0.38	0.56	0.54	0.53	0.49
16	0.53	0.47	0.57	0.30	0.52	0.55	0.43	0.49
17	0.45	0.40	0.63	0.65	0.46	0.31	0.39	0.46
18	0.56	0.44	0.50	0.47	0.44	0.23	0.36	0.43
19	0.44	0.50	0.49	0.45	0.42	0.37	0.42	0.40
20	0.51	0.56	0.48	0.55	0.32	0.42	0.45	0.35
21	0.53	0.46	0.60	0.55	0.44	0.40	0.30	0.40
22	0.43	0.22	0.53	0.51	0.54	0.54	0.42	0.49
23	0.46	0.32	0.51	0.41	0.33	0.37	0.49	0.52
24	0.34	0.41	0.55	0.51	0.25	0.26	0.44	0.35
25	0.25	0.48	0.34	0.35	0.42	0.41	0.32	0.34
26	0.50	0.35	0.46	0.37	0.33	0.26	0.35	0.15
27	0.39	0.56	0.42	0.45	0.27	0.43	0.50	0.45
28	0.43	0.35	0.53	0.69	0.36	0.39	0.58	0.55
29	0.45	0.43	0.44	0.53	0.37	0.51	0.41	0.51
30	0.35	0.26	0.44	0.45	0.34	0.48	0.31	0.48
31	0.36	0.25	0.45	0.48	0.39	0.46	0.34	0.39
32	0.36	0.43	0.48	0.51	0.39	0.58	0.20	0.30
33	0.35	0.19	0.40	0.42	0.33	0.36	0.32	0.32
34	0.34	0.49	0.33	0.30	0.40	0.47	0.38	0.44

(table continues)

Item	Form 7A		Form 7B		Form 8A		Form 8B	
	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial
35	0.33	0.38	0.37	0.47	0.29	0.30	0.24	0.43
36	0.35	0.35	0.38	0.43	0.38	0.38	0.26	0.20
37	0.30	0.38	0.33	0.37	0.25	0.27	0.24	0.32
38	0.32	0.35	0.38	0.25	0.25	0.26	0.23	0.27
39	0.12	0.21	0.26	0.22	0.29	0.33	0.23	0.35
40	0.20	0.20	0.34	0.39	0.19	0.15	0.24	0.30

Table 28

P-values and Point Biserials for Reading Tests - Forms 7A, 7B, 8A, 8B

	Form 7A		Form 7B		Form 8A		Form 8B	
Item	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial
1	0.73	0.46	0.76	0.42	0.75	0.46	0.69	0.43
2	0.66	0.53	0.75	0.40	0.59	0.51	0.59	0.55
3	0.67	0.42	0.65	0.41	0.58	0.52	0.54	0.43
4	0.65	0.52	0.64	0.30	0.53	0.54	0.45	0.36
5	0.62	0.56	0.67	0.36	0.57	0.50	0.48	0.48
6	0.68	0.19	0.55	0.45	0.45	0.35	0.36	0.40
7	0.39	0.42	0.74	0.39	0.50	0.45	0.49	0.44
8	0.30	0.42	0.50	0.28	0.34	0.42	0.64	0.38
9	0.61	0.41	0.69	0.33	0.72	0.49	0.52	0.39
10	0.64	0.44	0.65	0.55	0.65	0.48	0.54	0.54
11	0.63	0.49	0.52	0.45	0.59	0.51	0.45	0.40
12	0.54	0.37	0.39	0.35	0.69	0.45	0.61	0.52
13	0.35	0.43	0.55	0.48	0.34	0.14	0.54	0.45
14	0.37	0.46	0.48	0.50	0.45	0.50	0.43	0.43
15	0.39	0.35	0.36	0.48	0.38	0.40	0.40	0.33
16	0.41	0.41	0.35	0.27	0.28	0.32	0.48	0.38
17	0.45	0.59	0.37	0.41	0.60	0.54	0.41	0.53
18	0.54	0.55	0.61	0.39	0.46	0.51	0.33	0.35
19	0.60	0.53	0.59	0.46	0.45	0.53	0.41	0.29
20	0.32	0.33	0.49	0.53	0.43	0.54	0.50	0.54
21	0.35	0.40	0.51	0.51	0.39	0.50	0.30	0.24
22	0.33	0.39	0.46	0.48	0.36	0.36	0.33	0.40
23	0.44	0.49	0.35	0.52	0.46	0.48	0.38	0.42
24	0.37	0.44	0.25	0.22	0.30	0.32	0.23	0.15
25	0.23	0.34	0.38	0.42	0.27	0.07	0.31	0.33

Table 29

P-values and Point-Biserials for Science Reasoning Test - Forms 7A, 7B, 8A, 8B

	Form 7A		Form 7B		Form 8A		Form 8B	
Item	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial	p-value	Point-biserial
1	0.57	0.45	0.46	0.32	0.71	0.31	0.75	0.41
2	0.56	0.51	0.70	0.51	0.56	0.42	0.63	0.45
3	0.53	0.49	0.75	0.33	0.55	0.34	0.47	0.53
4	0.54	0.54	0.62	0.45	0.35	0.43	0.54	0.41
5	0.46	0.40	0.48	0.40	0.29	0.35	0.40	0.39
6	0.52	0.45	0.61	0.46	0.41	0.48	0.61	0.37
7	0.45	0.41	0.56	0.46	0.58	0.51	0.42	0.34
8	0.39	0.40	0.56	0.54	0.43	0.32	0.50	0.44
9	0.49	0.35	0.43	0.59	0.44	0.41	0.56	0.38
10	0.37	0.31	0.54	0.53	0.47	0.40	0.35	0.29
11	0.43	0.50	0.45	0.49	0.36	0.34	0.52	0.38
12	0.38	0.24	0.39	0.38	0.36	0.42	0.29	0.35
13	0.34	0.34	0.55	0.50	0.50	0.46	0.37	0.29
14	0.58	0.47	0.51	0.45	0.51	0.46	0.34	0.20
15	0.35	0.46	0.43	0.40	0.36	0.41	0.48	0.47
16	0.39	0.42	0.51	0.44	0.29	0.38	0.32	0.34
17	0.35	0.35	0.44	0.47	0.33	0.41	0.31	0.42
18	0.51	0.44	0.46	0.43	0.23	0.19	0.32	0.35
19	0.43	0.47	0.37	0.42	0.57	0.46	0.30	0.17
20	0.39	0.41	0.45	0.44	0.24	0.08	0.44	0.50
21	0.39	0.38	0.43	0.46	0.32	0.41	0.37	0.24
22	0.41	0.39	0.32	0.26	0.38	0.30	0.35	0.49
23	0.33	0.27	0.27	0.23	0.29	0.22	0.31	0.34
24	0.32	0.36	0.37	0.35	0.39	0.30	0.34	0.44
25	0.39	0.35	0.43	0.35	0.35	0.32	0.25	0.24
26	0.28	0.41	0.36	0.33	0.35	0.29	0.31	0.31
27	0.36	0.27	0.33	0.27	0.29	0.20	0.25	0.21
28	0.37	0.24	0.26	0.24	0.22	0.24	0.20	0.23
29	0.36	0.21	0.17	0.29	0.26	0.28	0.24	0.21
30	0.23	0.21	0.26	0.18	0.27	0.11	0.23	0.19

Table 30

Test and Subscore Correlations and Internal Consistency -Reliabilities - P-ACT+ Test Form 7A*

	1	2	3	4	5	6	7	8
1 English	0.925							
2 Usage/Mechanics	0.973	0.878						
3 Rhetorical Skills	0.946	0.846	0.842					
4 Mathematics	0.735	0.719	0.692	0.875				
5 Algebra	0.711	0.689	0.676	0.945	0.834			
6 Geometry	0.632	0.625	0.584	0.888	0.690	0.720		
7 Reading	0.745	0.718	0.716	0.652	0.628	0.563	0.825	
8 Science Reasoning	0.659	0.632	0.635	0.682	0.634	0.623	0.700	0.802

Number of observations: 1772

*KR20 internal consistencies on diagonal

Table 31

Test and Subscore Correlations and Internal Consistency -Reliabilities - P-ACT+ Test Form 7B*

	1	2	3	4	5	6	7	8
1 English	0.929							
2 Usage/Mechanics	0.975	0.890						
3 Rhetorical Skills	0.948	0.854	0.822					
4 Mathematics	0.727	0.709	0.689	0.902				
5 Algebra	0.713	0.695	0.677	0.963	0.852			
6 Geometry	0.664	0.649	0.627	0.936	0.806	0.781		
7 Reading	0.742	0.715	0.715	0.646	0.620	0.607	0.800	
8 Science	0.667	0.655	0.626	0.679	0.646	0.645	0.678	0.821

Number of observations: 1635

*KR20 internal consistencies on diagonal

Table 32

Test and Subscore Correlations and Internal Consistency -Reliabilities - P-ACT+ Test Form 8A*

	1	2	3	4	5	6	7	8
1 English	0.907							
2 Usage/Mechanics	0.967	0.854						
3 Rhetorical Skills	0.933	0.811	0.801					
4 Mathematics	0.735	0.713	0.682	0.881				
5 Algebra	0.699	0.679	0.647	0.950	0.814			
6 Geometry	0.676	0.655	0.629	0.921	0.752	0.765		
7 Reading	0.740	0.703	0.710	0.657	0.623	0.605	0.825	
8 Science Reasoning	0.649	0.617	0.620	0.691	0.646	0.648	0.658	0.747

Number of observations: 1668

*KR20 internal consistencies on diagonal

Table 33

Test and Subscore Correlations and Internal Consistency -Reliabilities - P-ACT+ Test Form 8B*

	1	2	3	4	5	6	7	8
1 English	0.919							
2 Usage/Mechanics	0.972	0.884						
3 Rhetorical Skills	0.932	0.820	0.799					
4 Mathematics	0.694	0.670	0.653	0.862				
5 Algebra	0.674	0.649	0.637	0.944	0.793			
6 Geometry	0.605	0.586	0.566	0.906	0.715	0.726		
7 Reading	0.751	0.718	0.718	0.613	0.595	0.534	0.792	
8 Science	0.670	0.637	0.645	0.632	0.602	0.565	0.675	0.751

Number of observations: 1611

*KR20 internal consistenices on diagonal

Table 34

Stout Test Results

Form	English Test	Mathematics Test	Reading Test	Science Reasoning Test
7A	4.17	2.57	4.09	.02*
	5.13	2.62	4.17	1.93*
7B	6.61	2.98	4.97	3.37
	6.30	2.68	5.64	4.82
8A	6.64	3.36	4.19	4.03
	8.77	1.15*	3.74	2.63
8B	9.80	3.40	5.12	.33*
	9.34	4.30	3.64	-.65*

Note: These statistics are asymptotically normal.

*P > .05

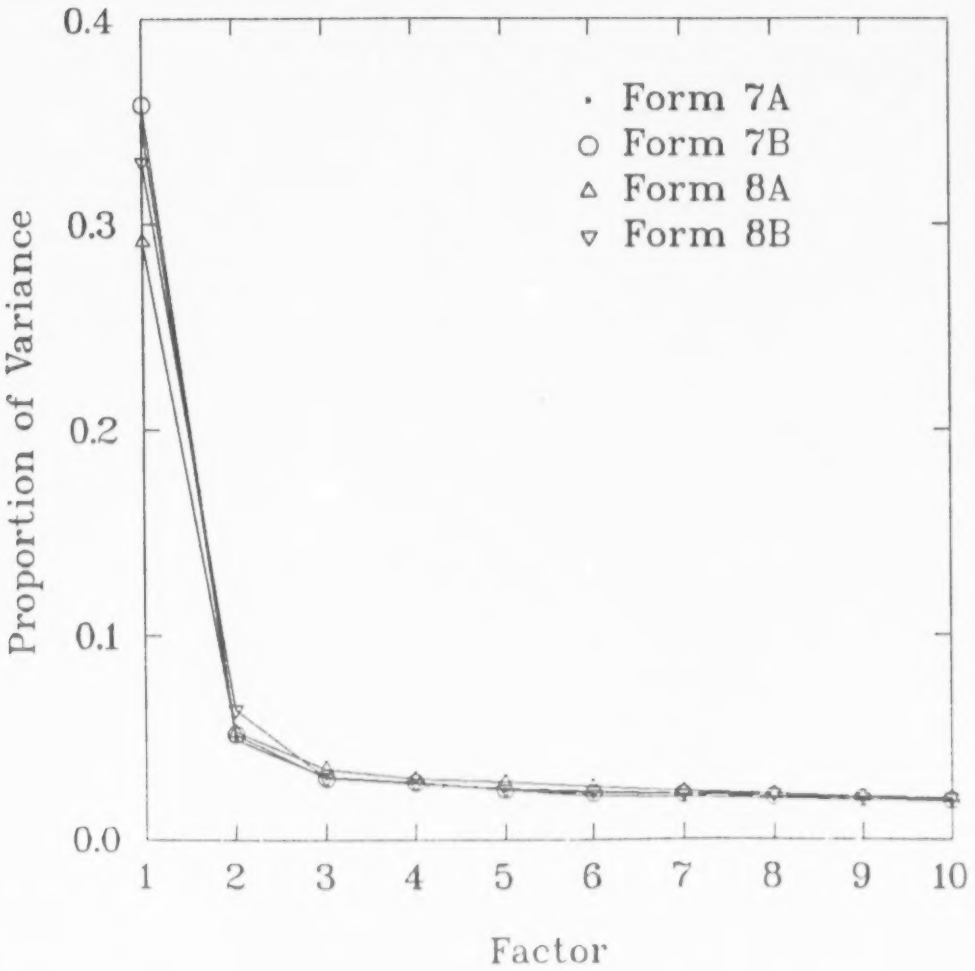

Figure 1. Eigenvalue Plots for English Items

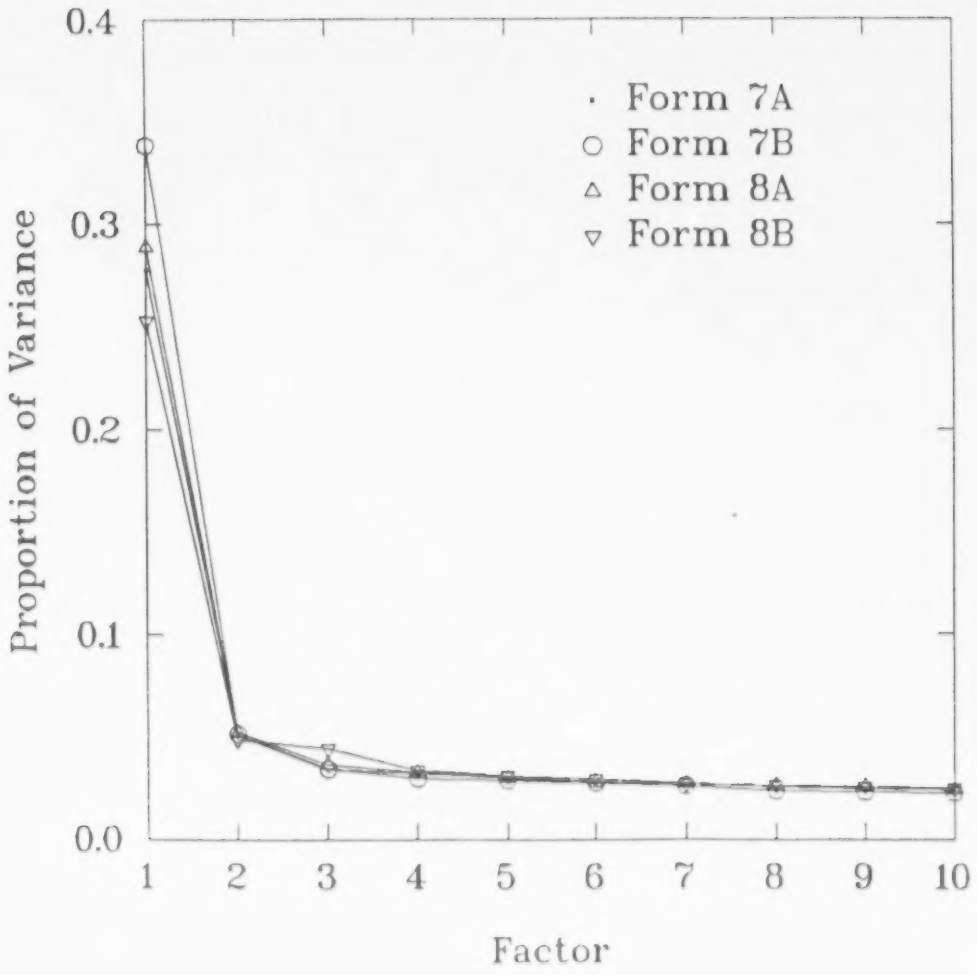

Figure 2. Eigenvalue Plots for Math Items

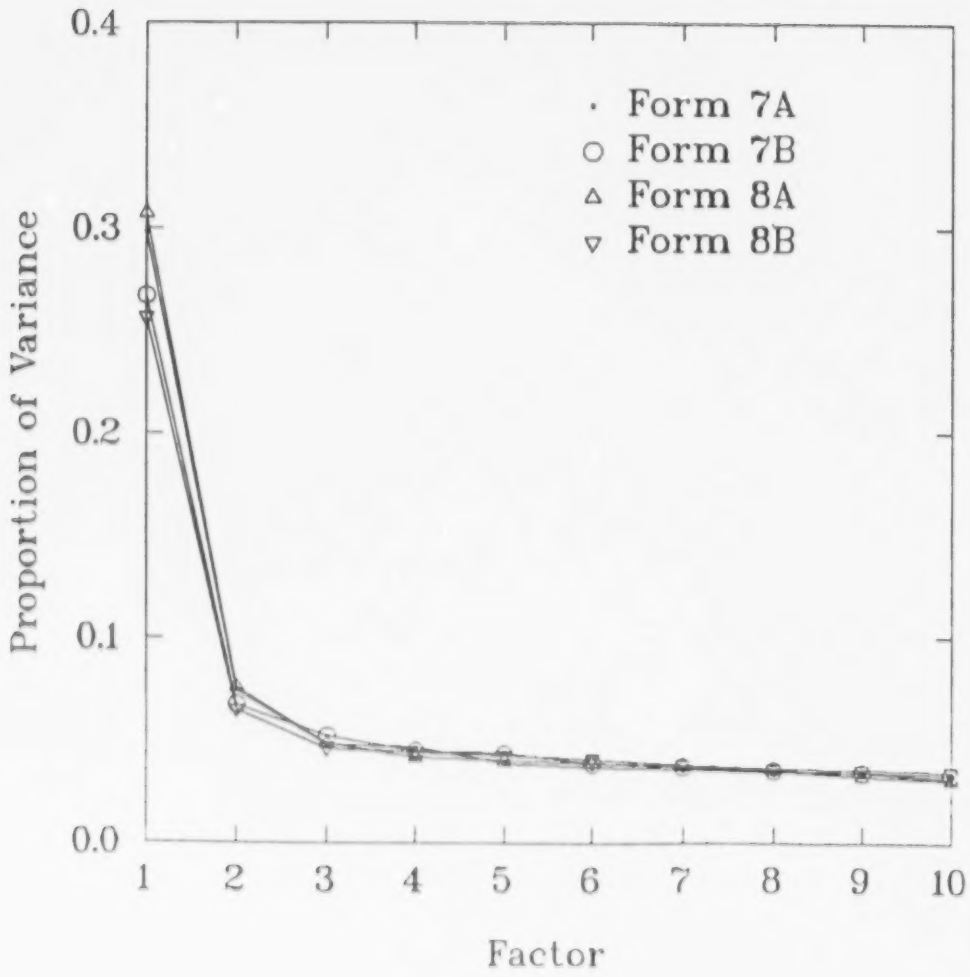

Figure 3. Eigenvalue Plots for Reading Items

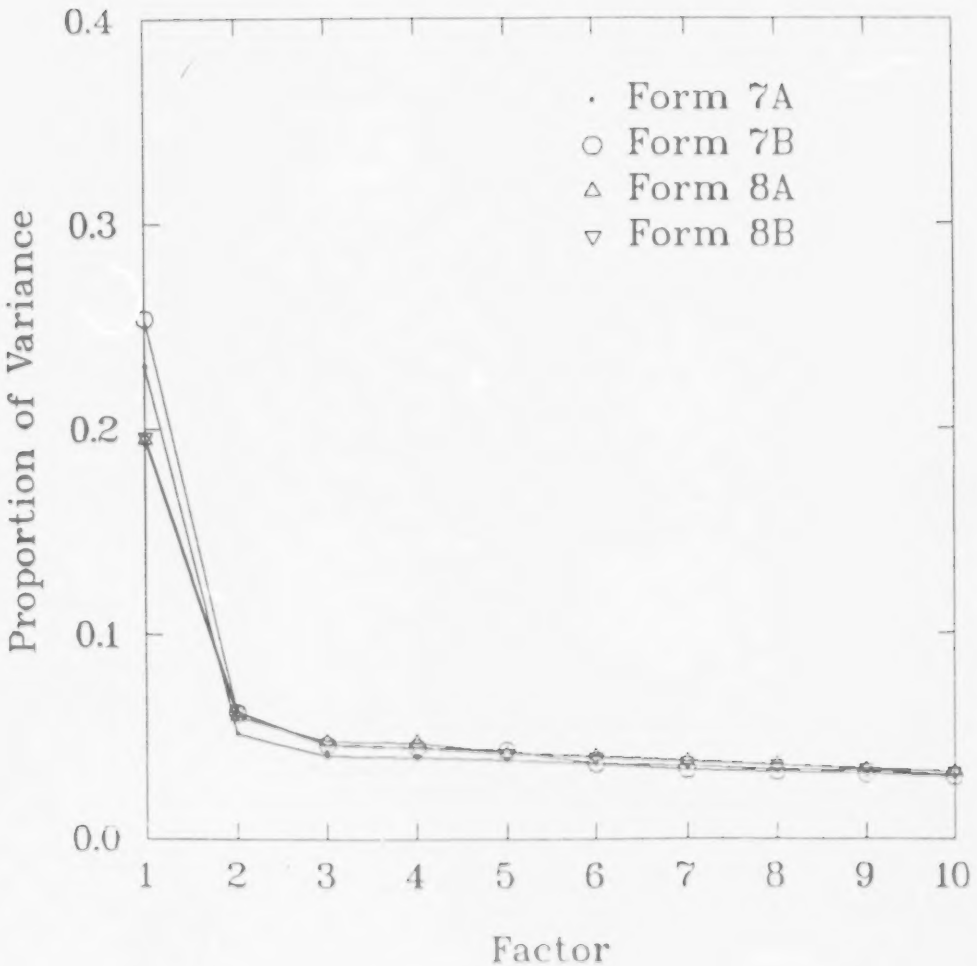

Figure 4. Eigenvalue Plots for Science Items

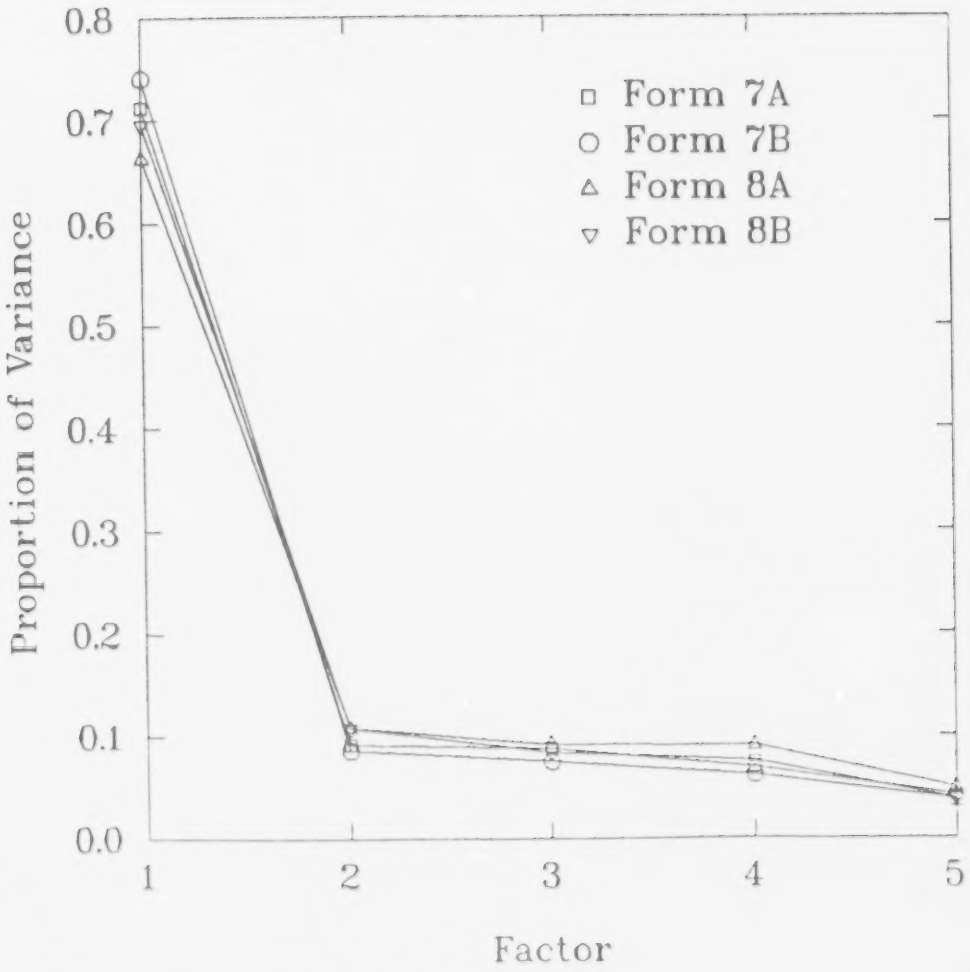

Figure 5. Eigenvalue Plots for English Content Area Scores

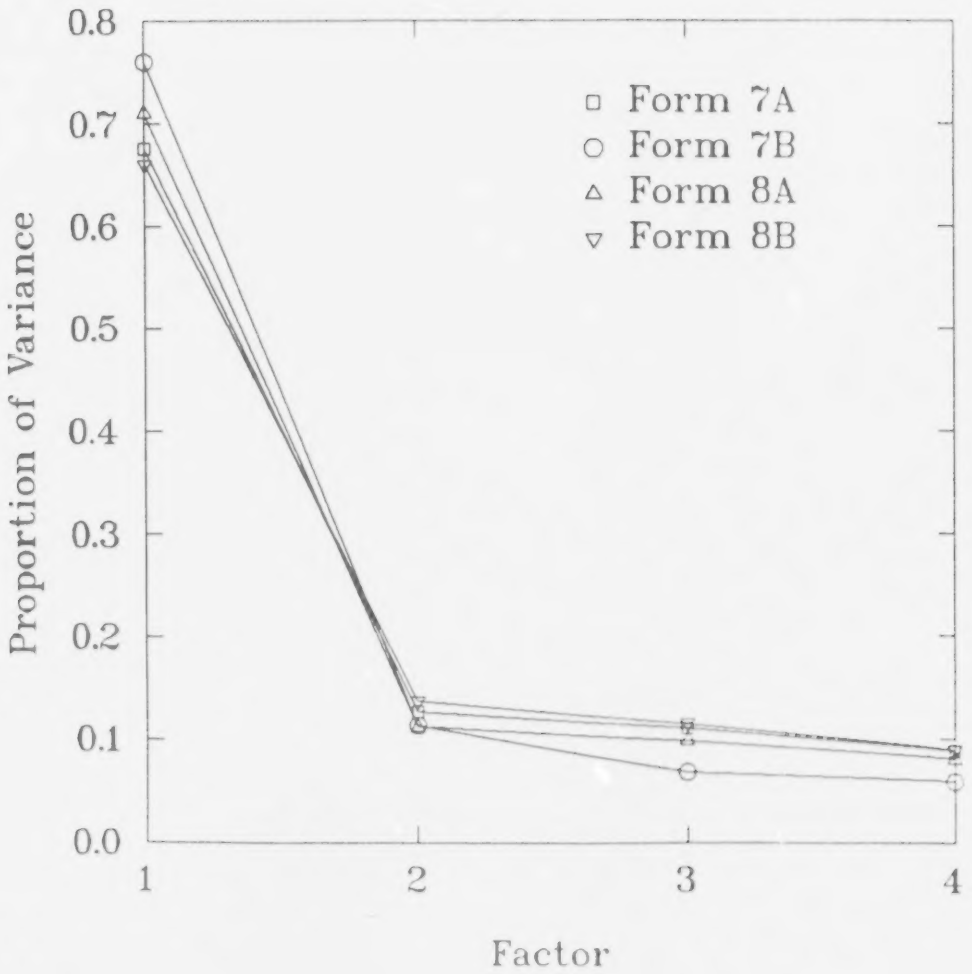

Figure 6. Eigenvalue Plots for Math Content Area Scores

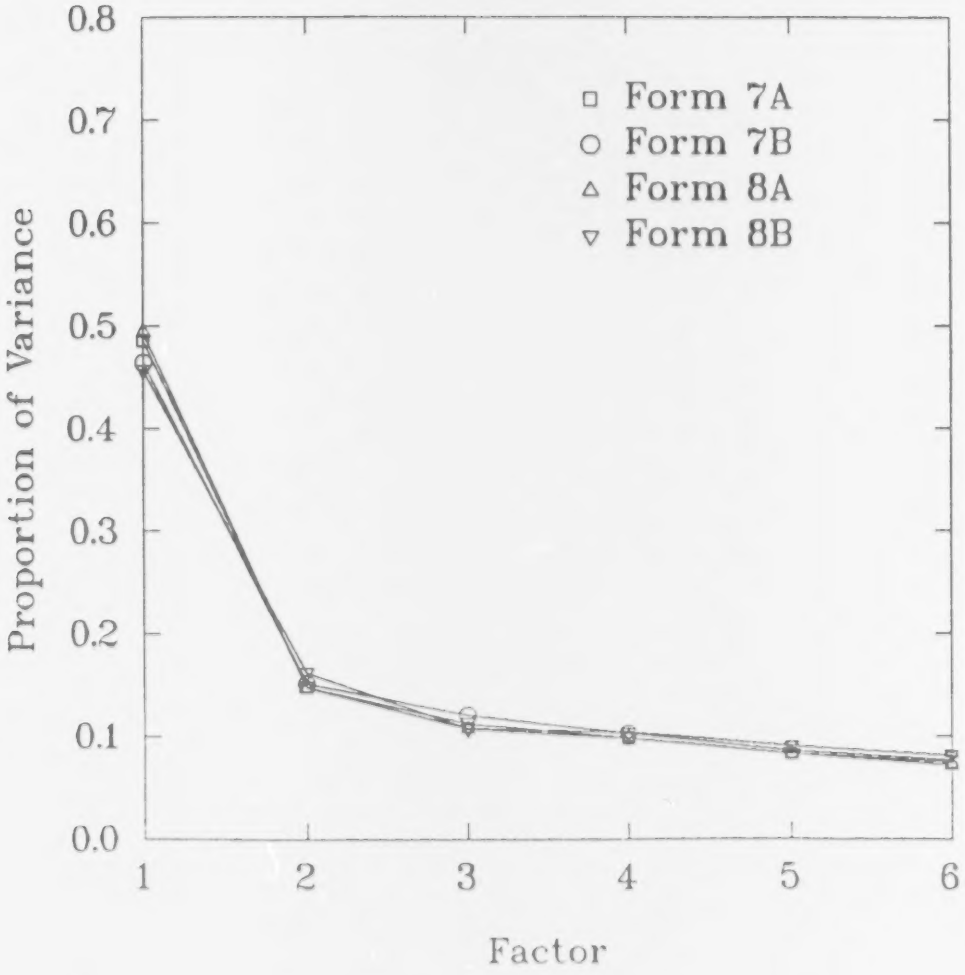

Figure 7. Eigenvalue Plots for Reading Content Area Scores

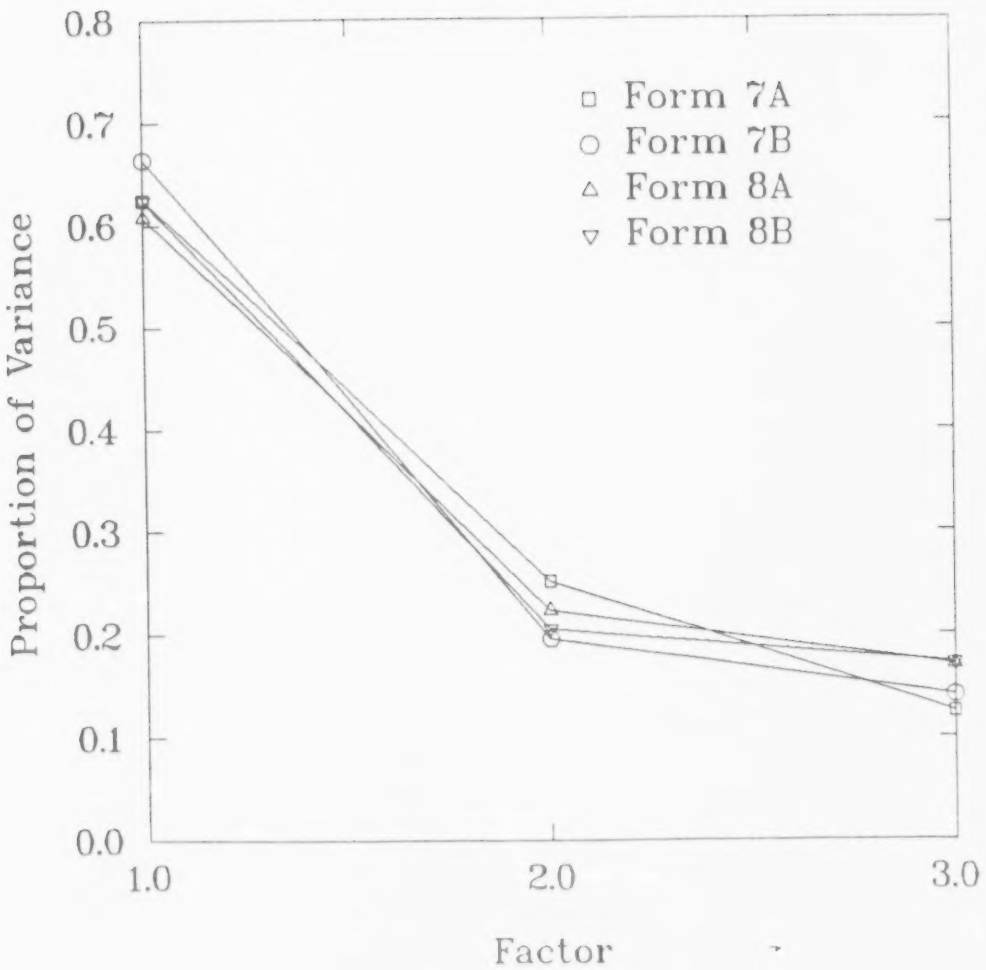

Figure 8. Eigenvalue Plots for Science Content Area Scores

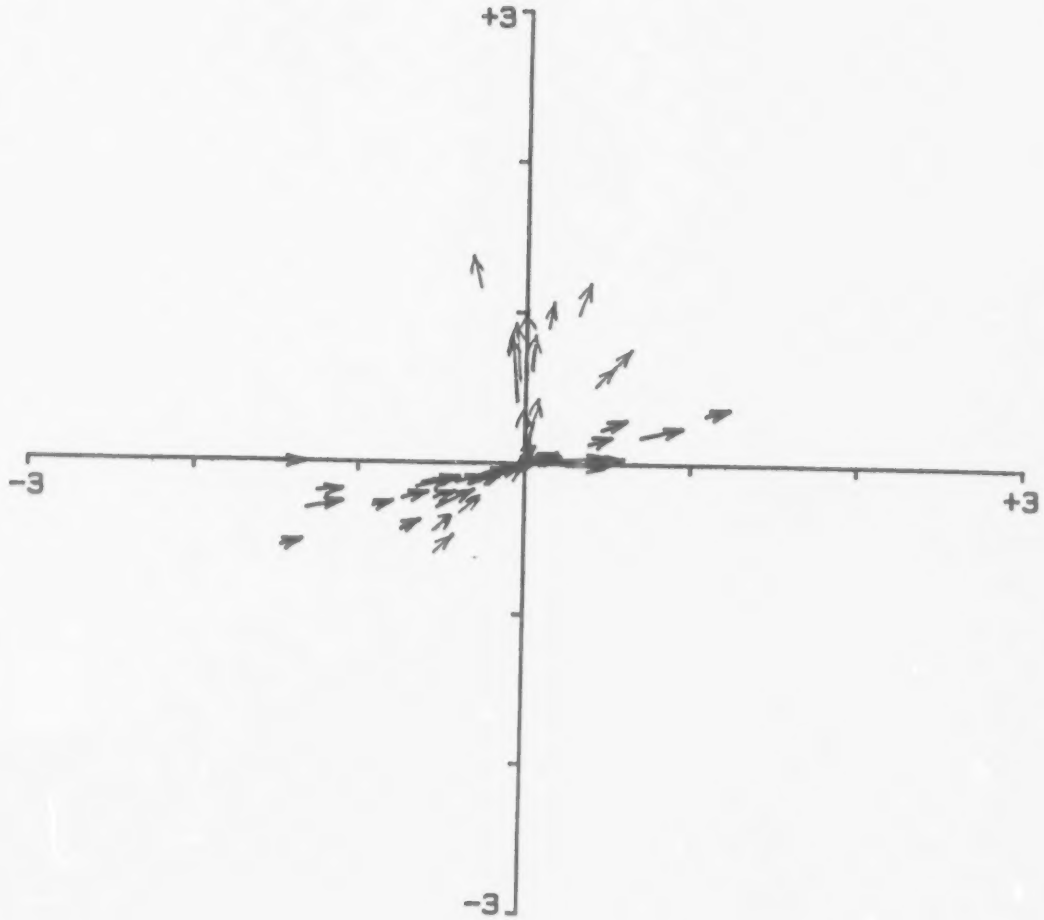

Figure 9. Plot of Item Vectors English Form 7A

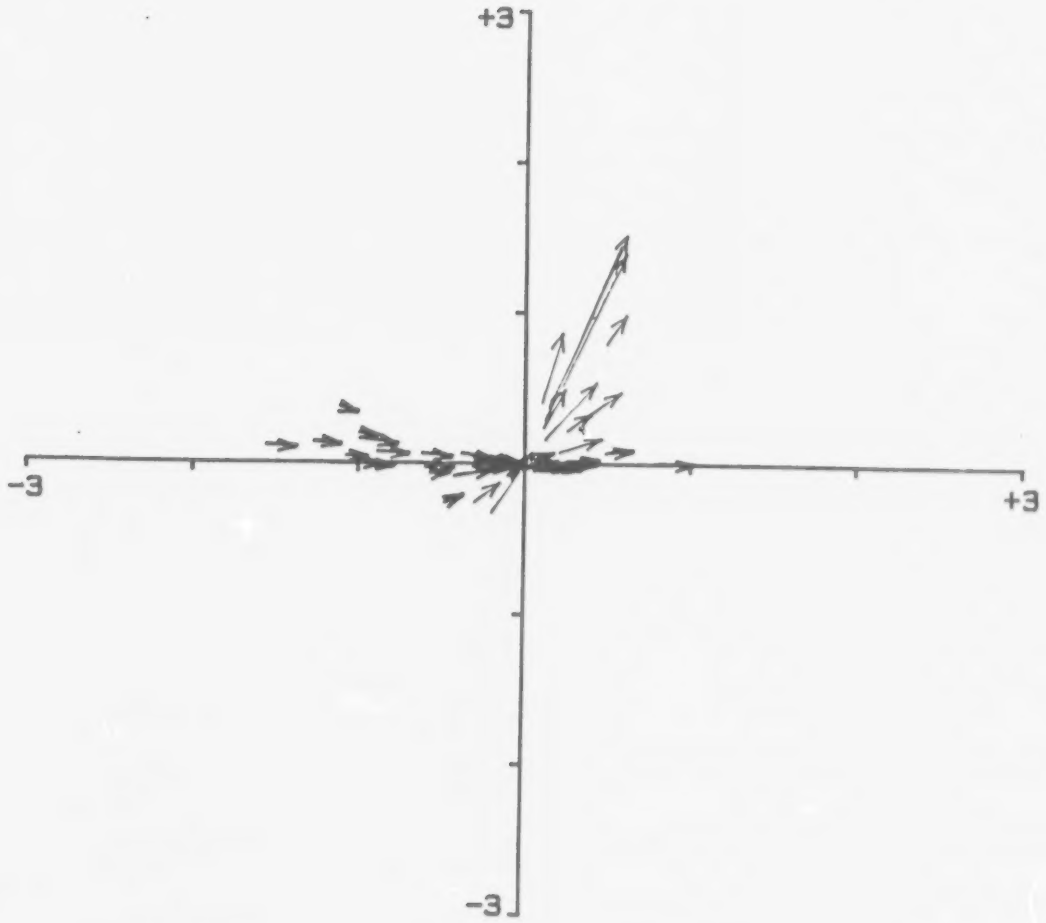

Figure 10. Plot of Item Vectors English Form 7B

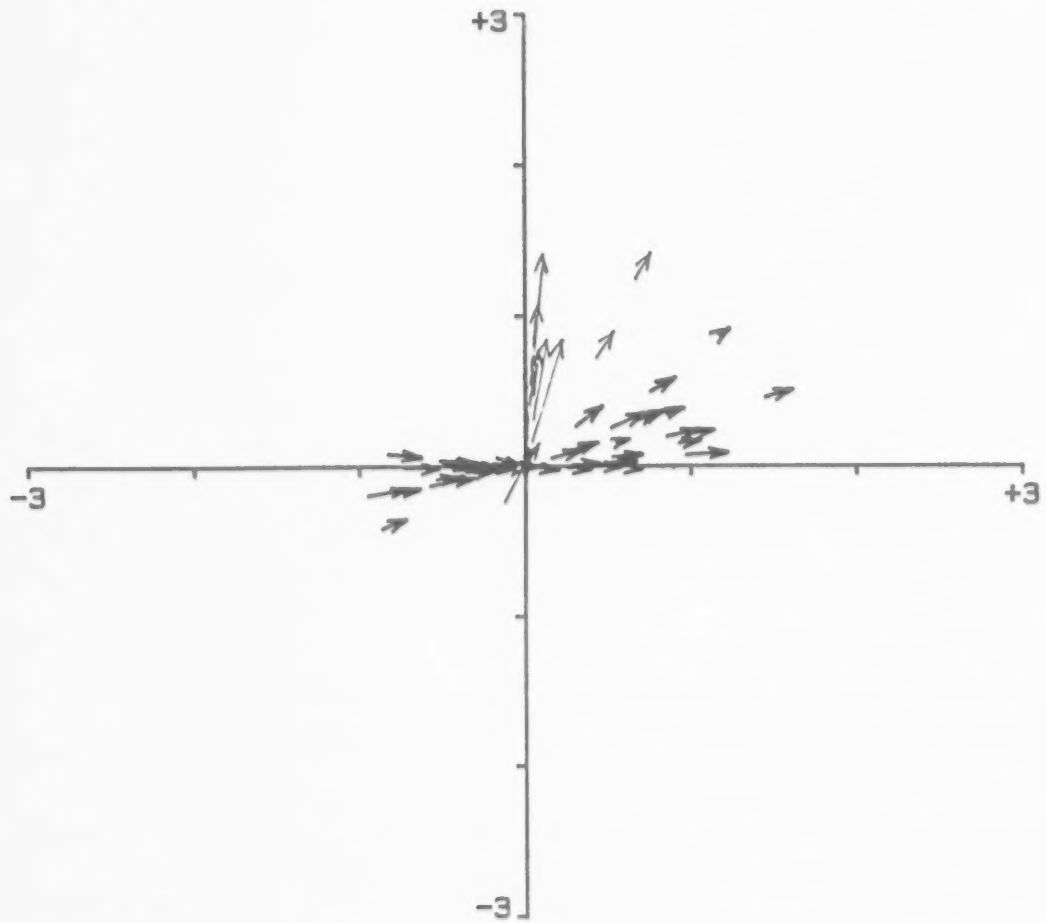

Figure 11. Plot of Item Vectors English Form 8A

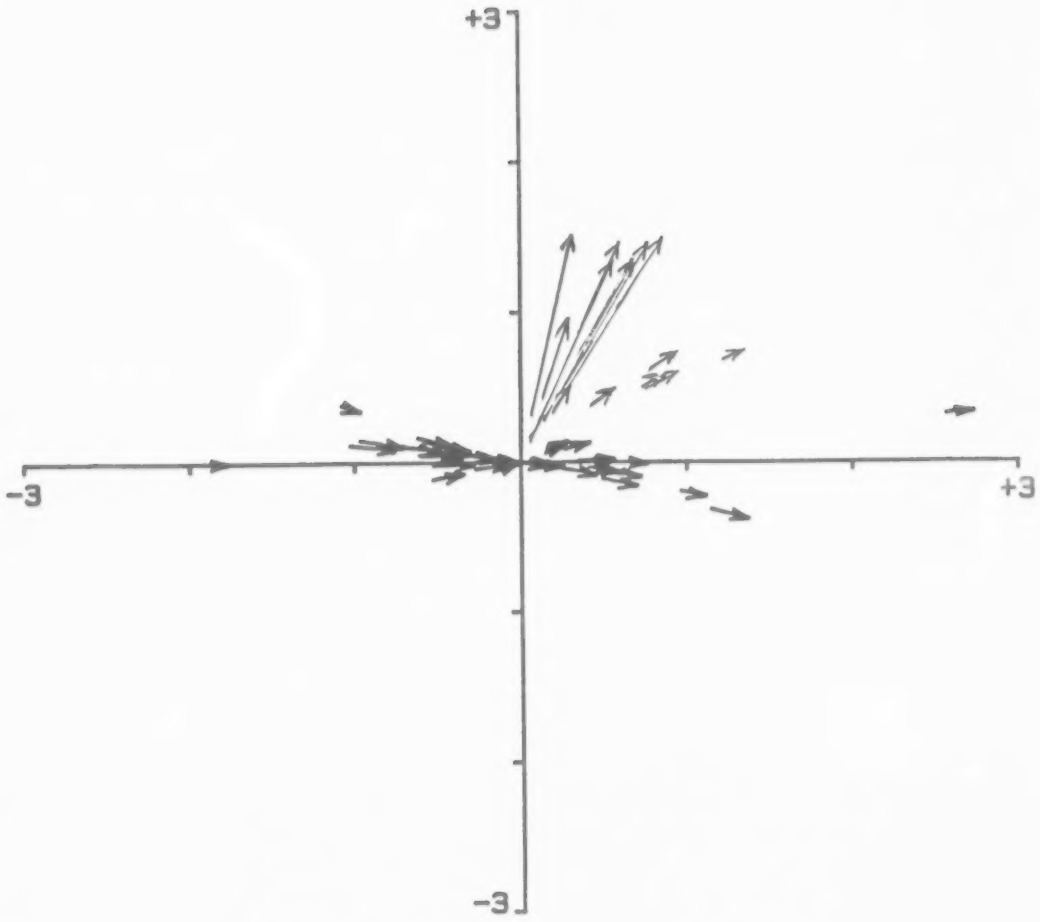

Figure 12. Plot of Item Vectors English Form 8B

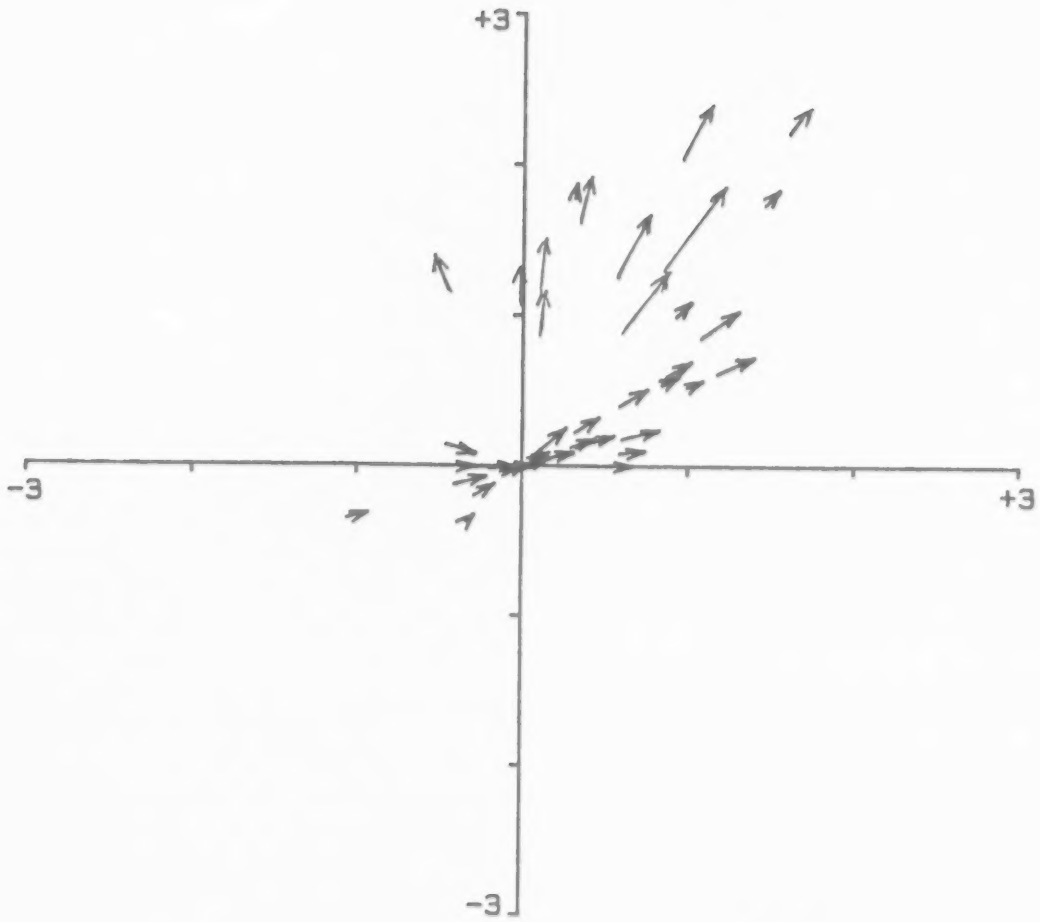

Figure 13. Plot of Item Vectors Mathematics Form 7A

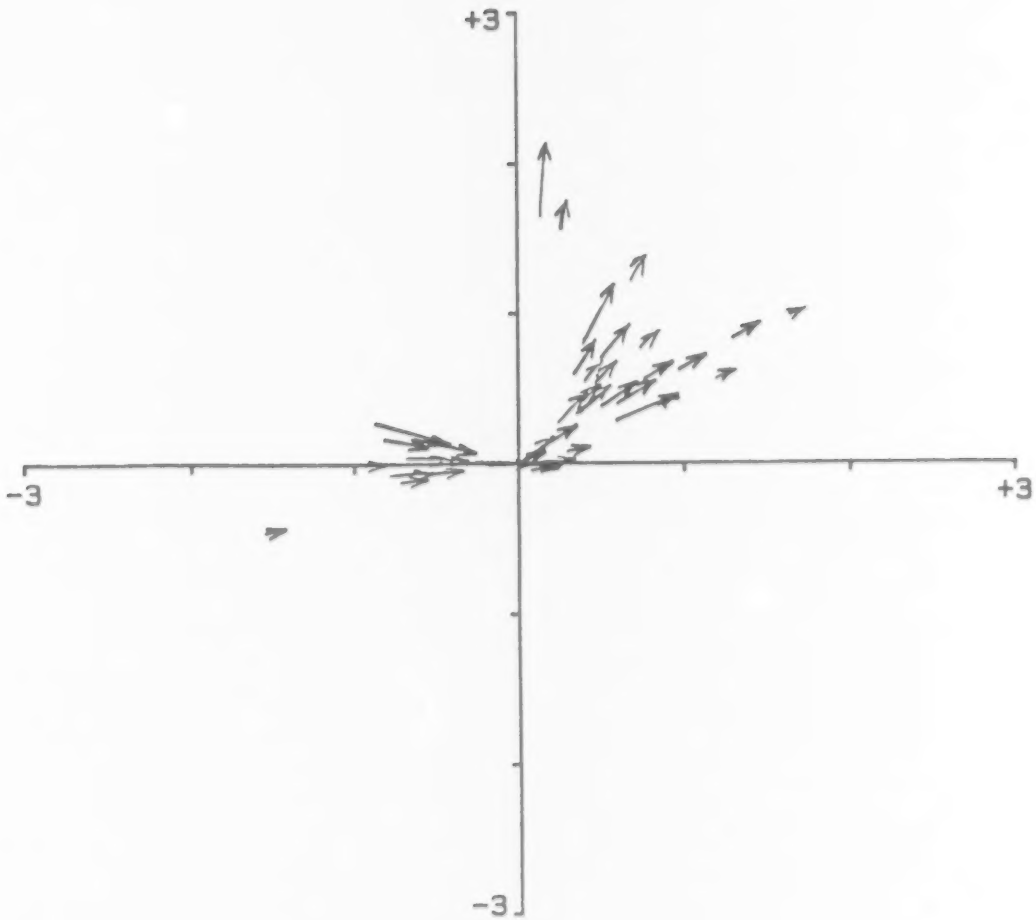

Figure 14. Plot of Item Vectors Mathematics Form 7B

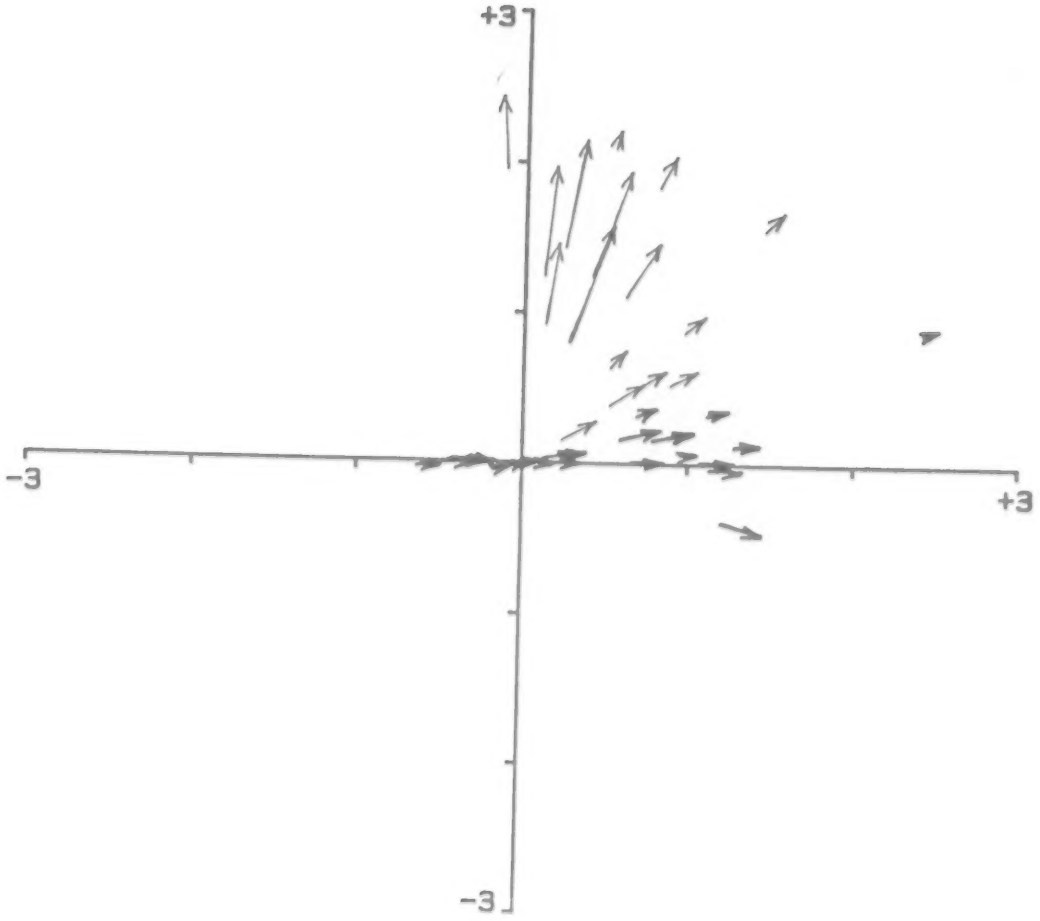

Figure 15. Plot of Item Vectors Mathematics Form 8A

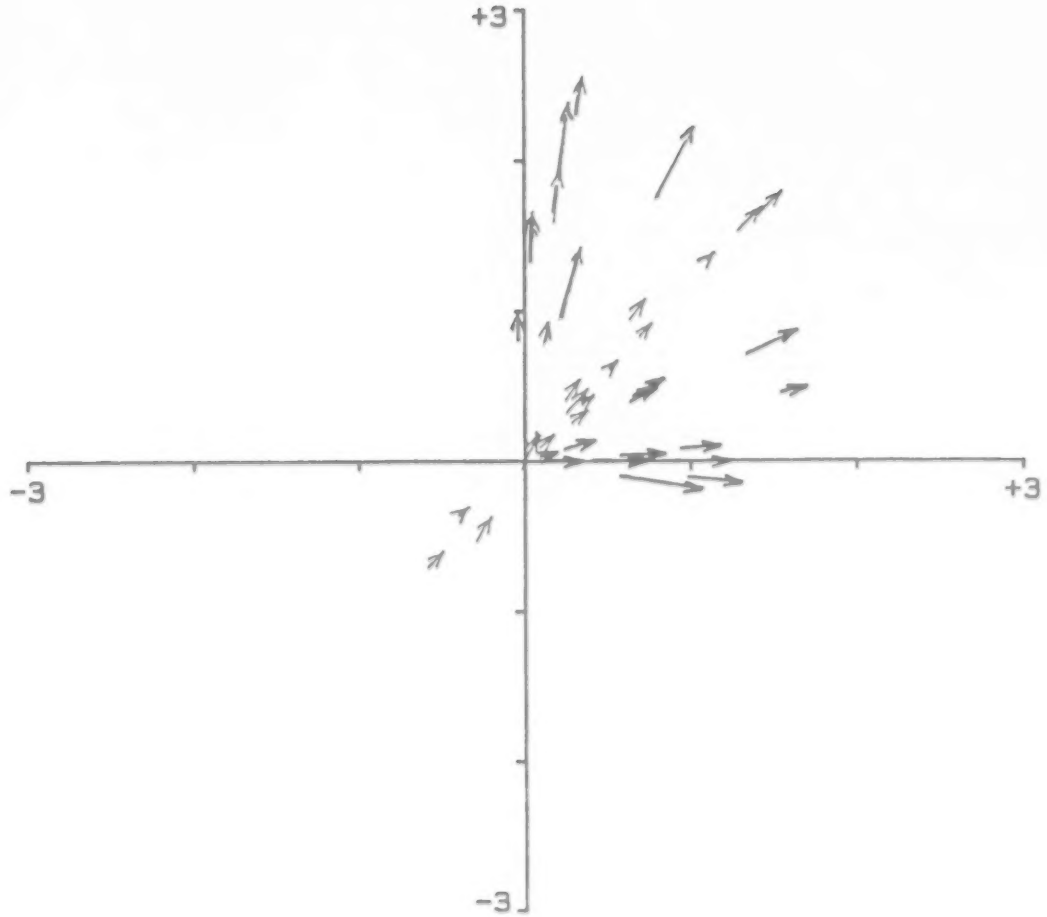

Figure 16. Plot of Item Vectors Mathematics Form 8B

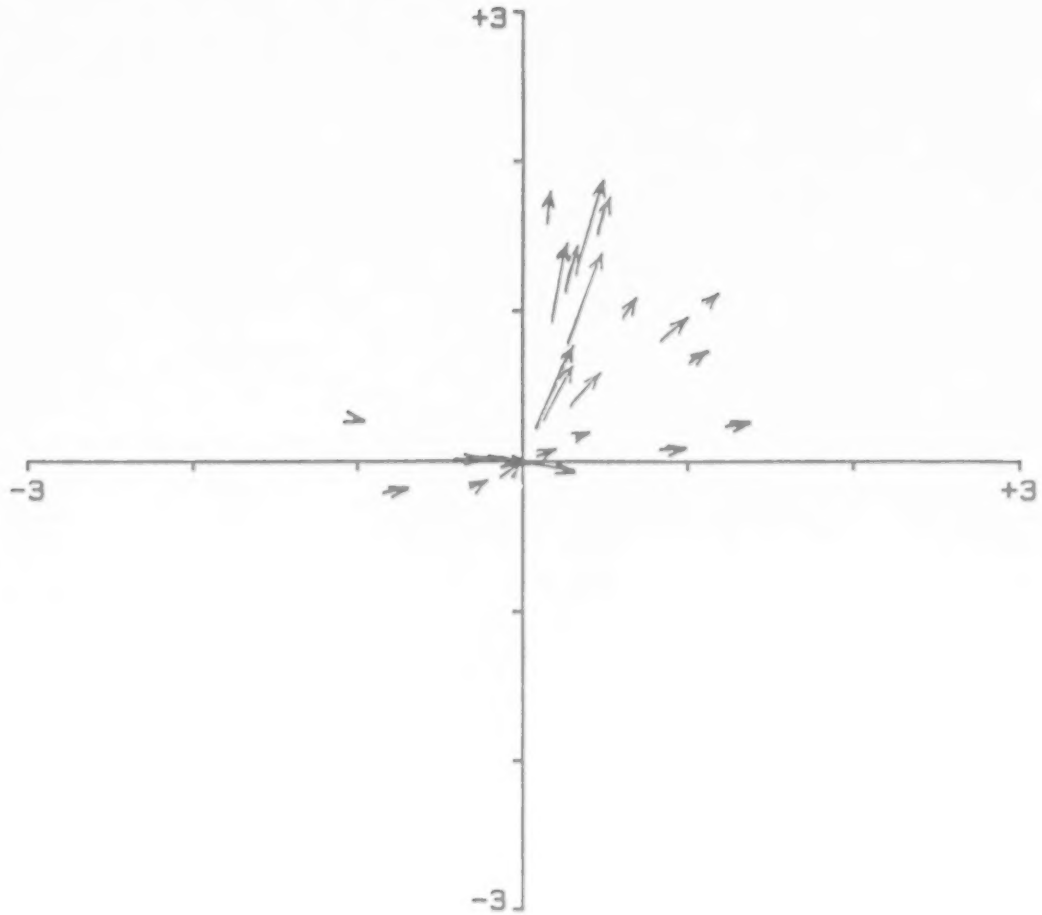

Figure 17. Plot of Item Vectors Reading Form 7A

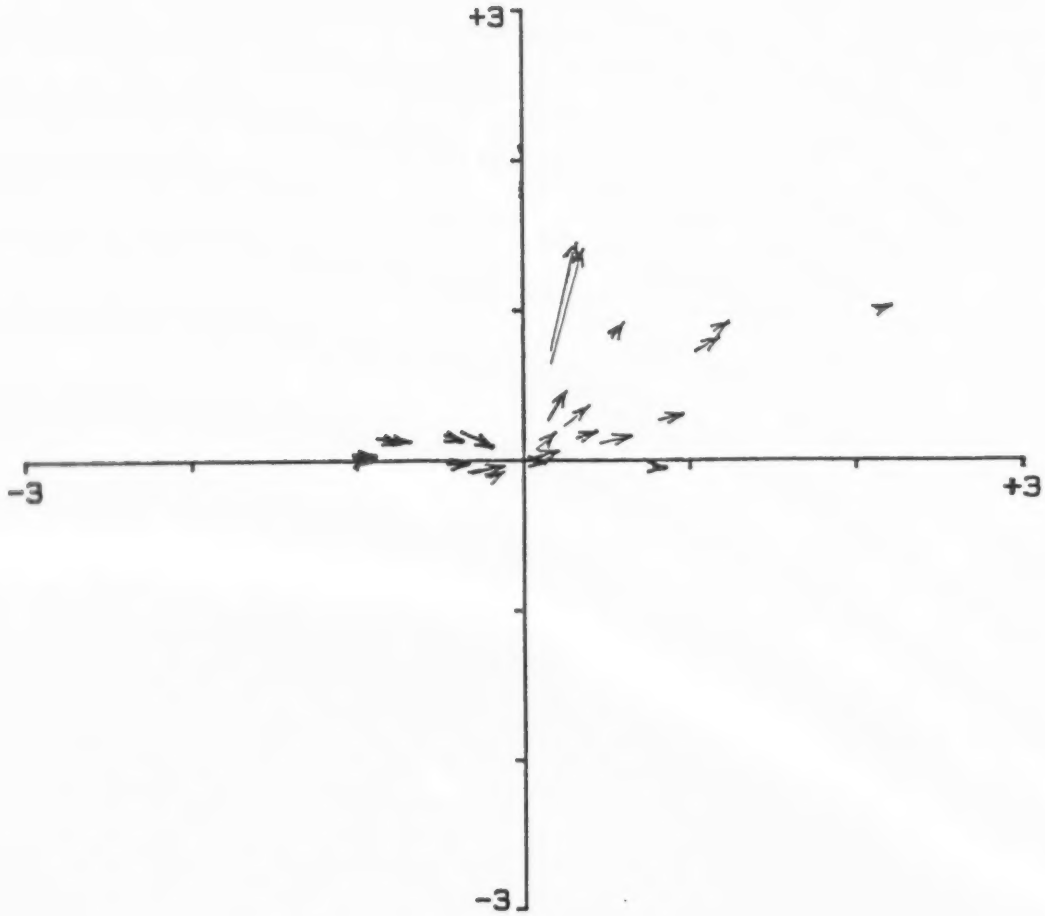

Figure 18. Plot of Item Vectors Reading Form 7B

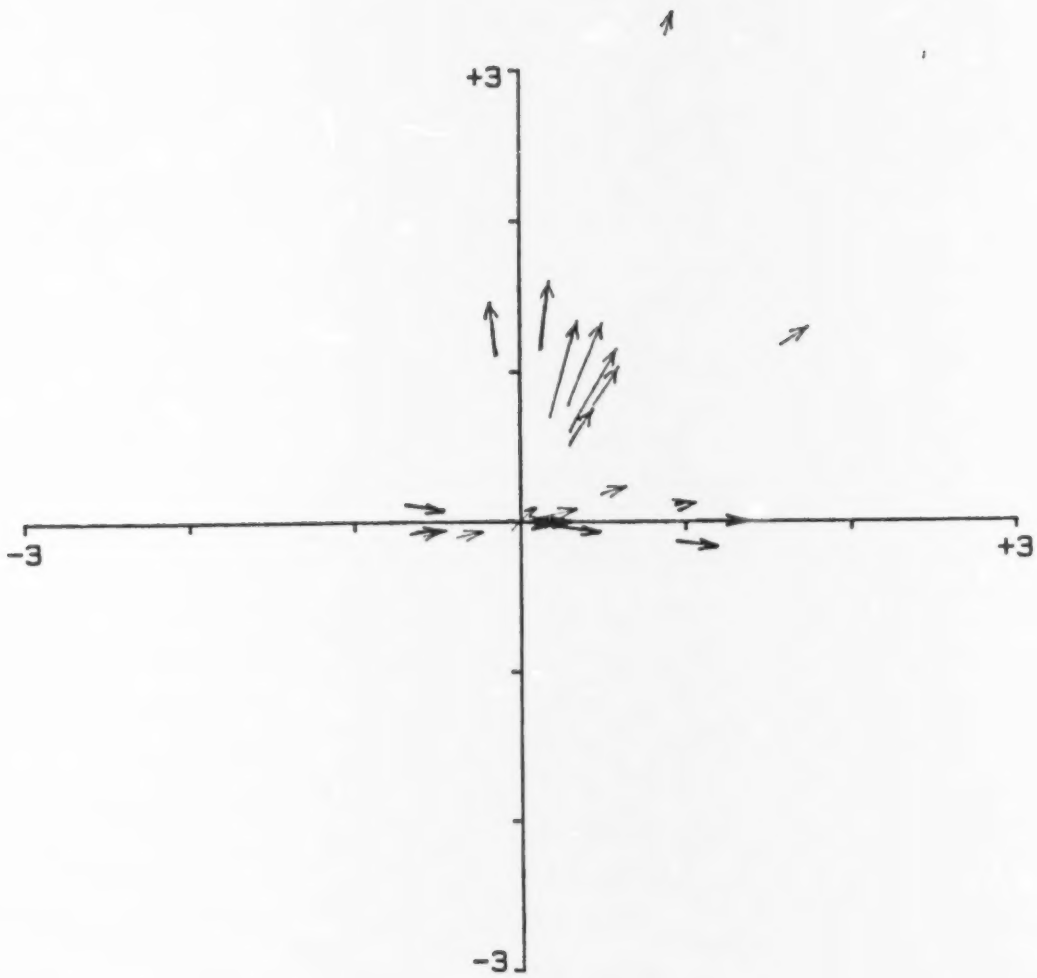

Figure 19. Plot of Item Vectors Reading Form 8A

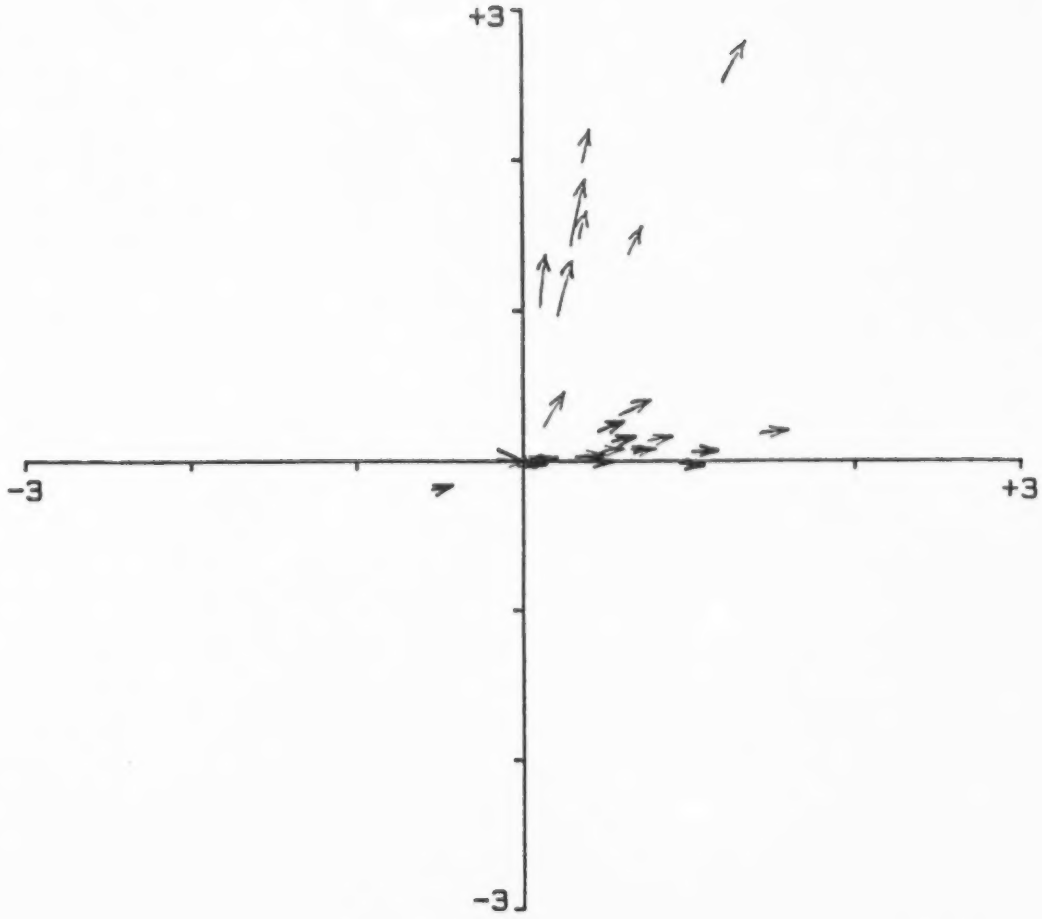

Figure 20. Plot of Item Vectors Reading Form 8B

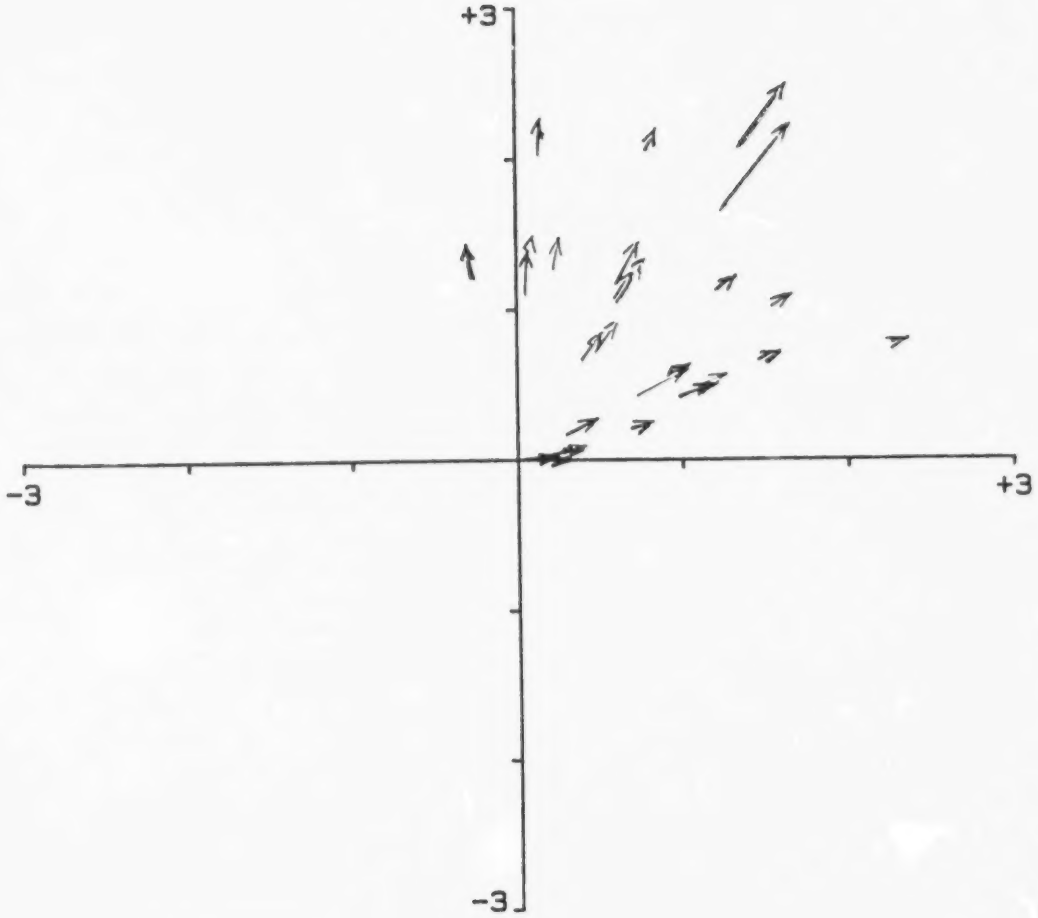

Figure 21. Plot of Item Vectors Science Reasoning Form 7A

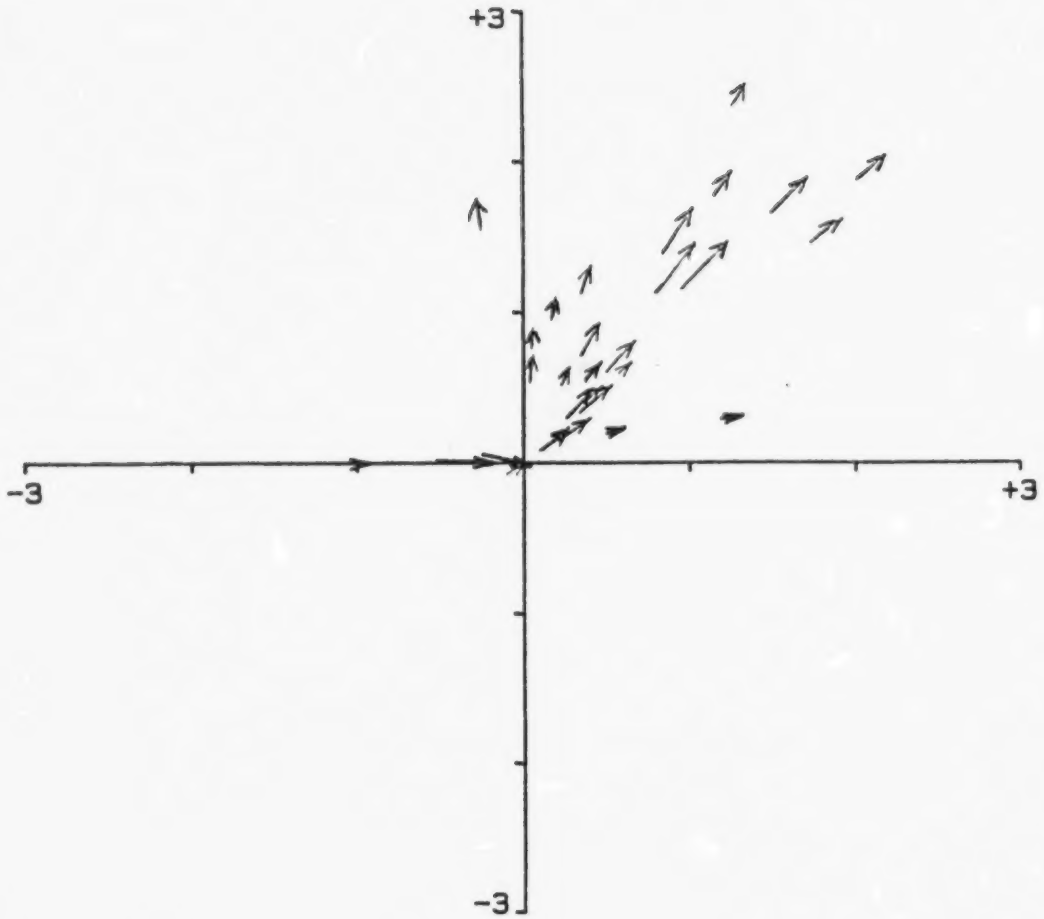

Figure 22. Plot of Item Vectors Science Reasoning Form 7B

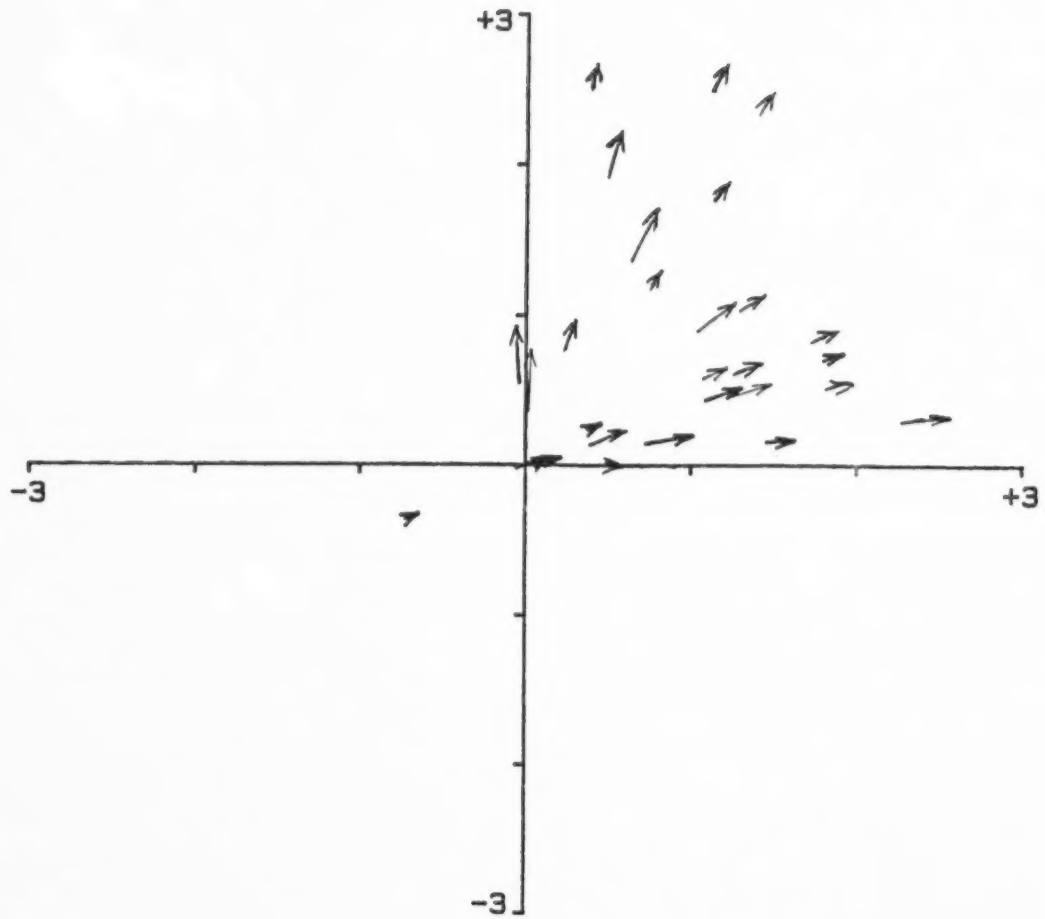

Figure 23. Plot of Item Vectors Science Reasoning Form 8A

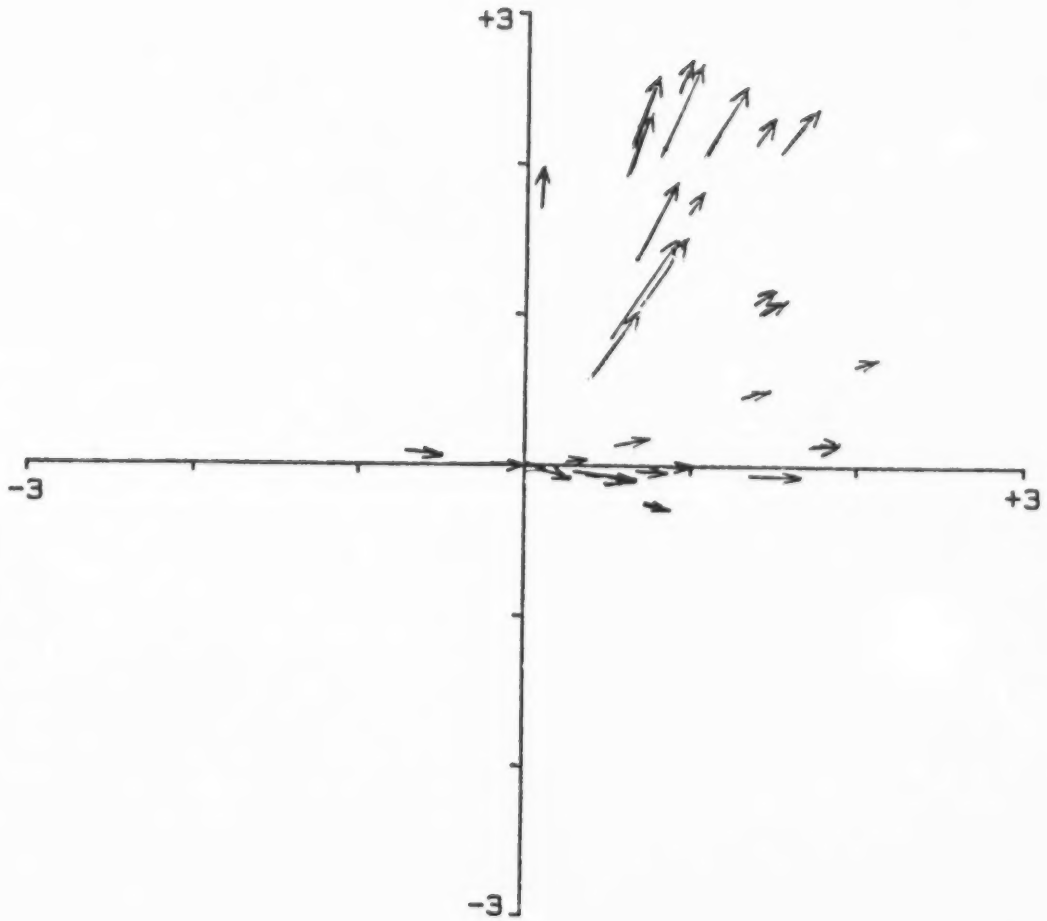

Figure 24. Plot of Item Vectors Science Reasoning Form 8B